283

CONTENTS

TRADE NAME	MODEL	SET AND FOLDER No.
Bendix	KS21E, EU, KST21E, EU, TS21E, EU, TSF21E, EU (Ch. T18-1, -2) Tel. Rec.	283-1
CBS-Columbia	22C05, 22C07, B, M, 22T09, B, EB (Ch. 921-12) Tel. Rec.	283-2
David Bogen	J-15	283-3
Espey	500A	283-4
Firestone	13-G-168, -169, -172, -173 (Codes 334-4-AM57A, 334-4-AS57A) Tel. Rec.	283-5
Granco	610	283-6
Hallicrafters	5R60, 5R61	283-7
Mopar	613, 614	283-8
Motorola	19CK1, B, 19CK2, B, 19CT1, B (Ch. TS-902A-03, -04 & Ch. BP-902A-01), Y19CK1, B, Y19CK2, B, Y19CT1, B (Ch. TS-902AY-03, -04 & Ch. BP-902A-01) Tel. Rec.	283-9
Regency	TR-1	283-10
Silvertone	5036, 5042 (Ch. 528.32400, 528.32500)	283-11
Stromberg-Carlson	C-5 (Deluxe)	283-12
Truetone	D2552A, D2553A	283-13
V-M	131	283-14
Westinghouse	H-499T5, H-500T5, H-501T5, H-502T5, H-503T5 (Ch. V-2184-6)	283-15

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

BENDIX MODELS KS21E, EU, KST21E, EU, TS21E, EU, TSF21E, EU (Ch. T18-1, -2)

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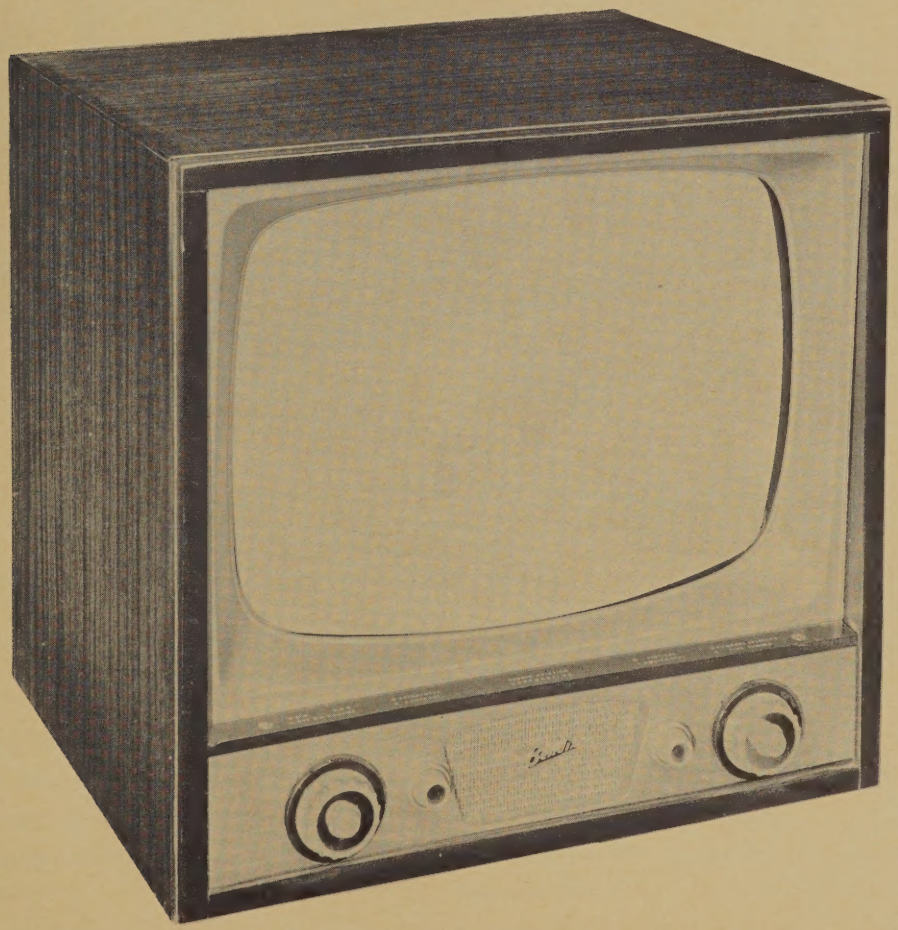

MODEL TSF21E

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DATE 7–55 SET 283 FOLDER 1

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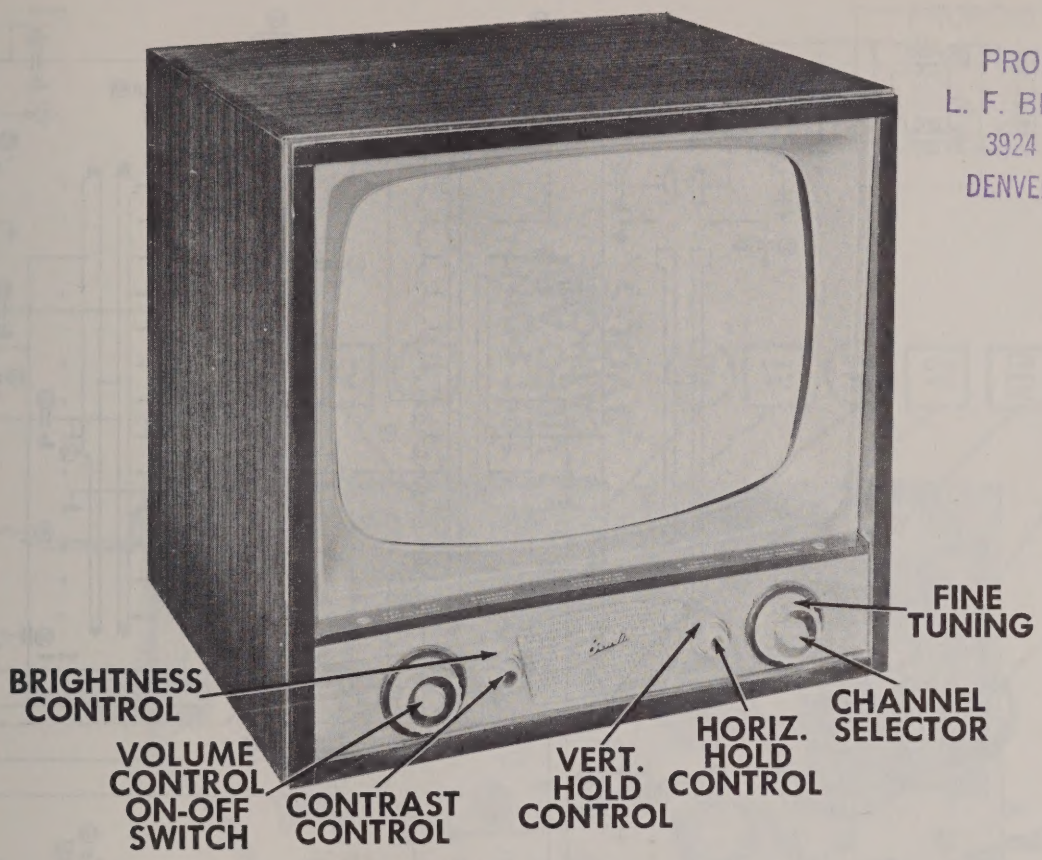

BENDIX MODEL TSF21E

TRADE NAME	Bendix	MODELS	CHASSIS
		KS21E, KST21E, TS21E, TSF21E	T18-1
		KS21EU, KST21EU, TS21EU, TSF21EU	T18-2
MANUFACTURER	Bendix Radio, Div. of Bendix Aviation Corp., Baltimore 4, Md.		
TYPE SET	Television Receiver		
TUBES	Twenty-one		
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING 1.3 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

INDEX

Alignment Instructions 6, 7
Disassembly Instructions 18
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions 14, 15, 16
Photographs
Cabinet-Rear View 11
Capacitor Identification 4, 9
Chassis-Top View 3
RF Tuner 10, 13
Resistor Identification 19, 20
Photographs (Cont)
Trans., Inductor & Alignment Identification 13
Resistance Measurements 8
Servicing in the Field 18
Schematic (TV) 2
Schematic (UHF) 17
Trouble Shooting Aids 12, 17
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

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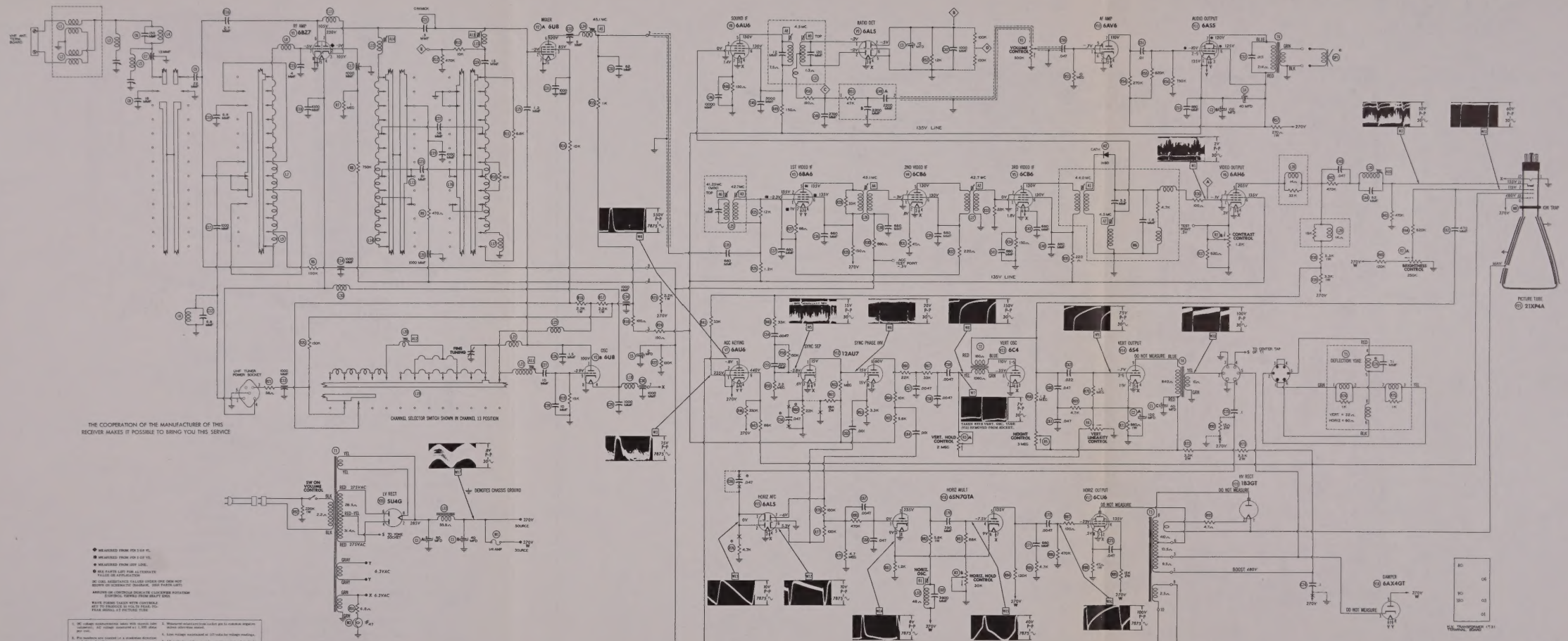
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
135V LINE
DENOTES CHASSIS GROUND
DO NOT MEASURE
BOOST 480V
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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CHASSIS TOP VIEW

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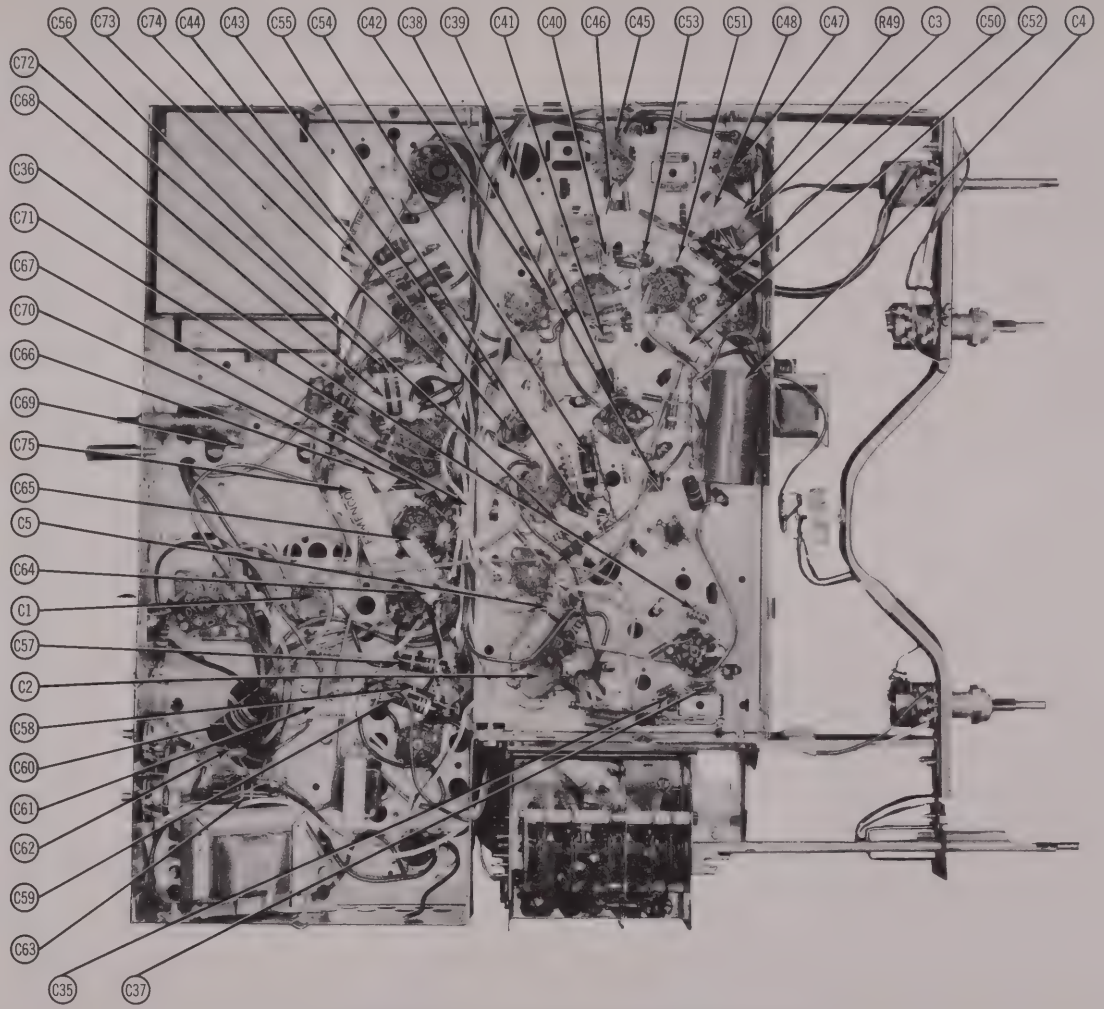

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CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART

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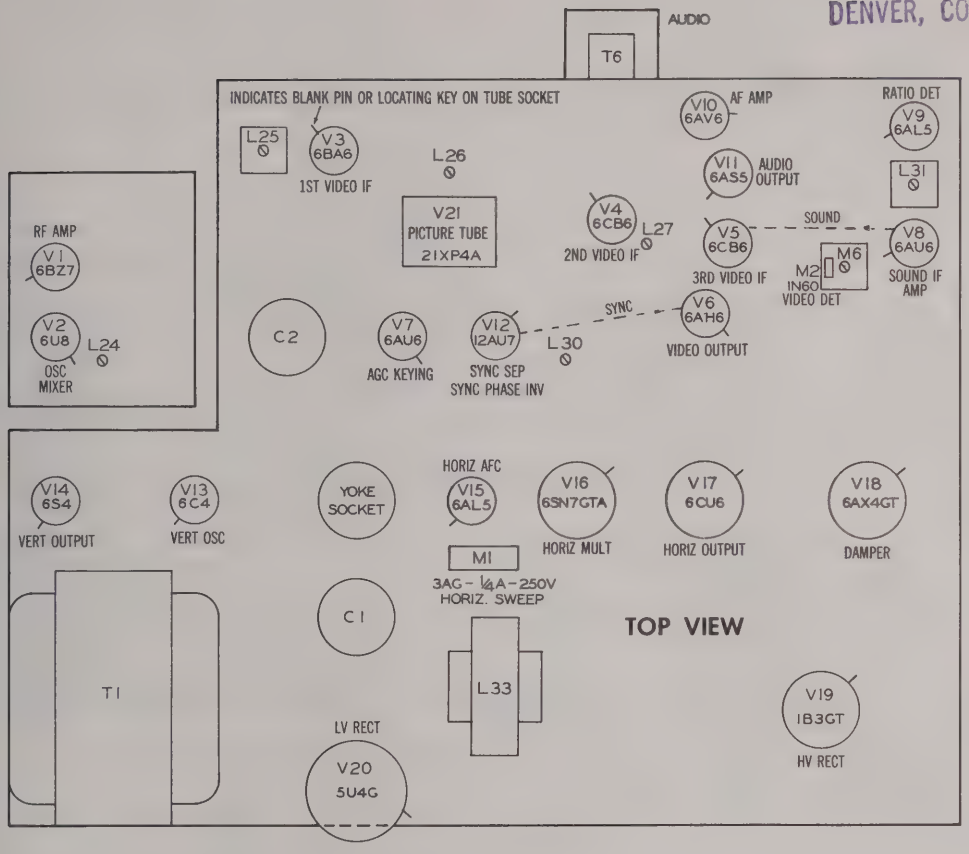

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V20**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V11**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V7, V21**
Has pic, no sound - **V8, V9, V10, V11**
Overloaded picture - **V7**

SYNC FAILURE
No vert. sync - **V12, V13**
No horiz. sync - **V12, V15, V16**
No vert. or horiz. sync - **V12**

SWEEP FAILURE
No raster, has sound - **V16, V17, V18, V19, V21**
No vertical deflection - **V13, V14**
Poor vert. linearity or foldover -**V13, V14**
Poor horiz. linearity or foldover - **V16, V17, V18**
Narrow picture - **V16, V17, V18, V19, V20**
Vert. off freq. - **V12, V13**
Horiz. off freq. - **V12, V15, V16**

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal multivibrator tube to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the AGC keying tube (V7) from its socket. Connect the negative lead of a 3 volt bias supply to the IF AGC test point. Connect positive lead to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube (V2). Low side to chassis.	44MC (Unmod)	Any non-interfering channel.	DC probe to point (A). Common to chassis.	A1	Adjust for maximum deflection.
2.	"	"	42.7MC	"	"	A2, A3	"
3.	"	"	45.1MC	"	"	A4, A5	"
4.	"	"	41.25MC	"	"	A6	Increase signal generator output. Adjust for MINIMUM deflection.

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	Direct	High side to an ungrounded tube shield floating over converter tube (V2). Low side to chassis.	43MC (10MC Swp)	41.25MC 45.75MC	Any non-interfering channel.	Vert. amp. thru 47KΩ to point (A). Low side to chassis.		Check for response curve similar to Fig. 1. If necessary, retouch A1 thru A5 for desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point (B) to chassis. The junction of these two resistors is alignment point (D) as shown on the schematic.
Increase the bias as used under "Video IF Alignment" to -9 volts.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
6.	Direct	High side to point (A). Low side to chassis.	4.5MC (unmod)	Any non-interfering channel.	DC probe to point (B). Common to chassis.	A7, A8	Adjust for maximum deflection.
7.	"	"	"	"	DC probe to point (C). Common to point (D).	A9	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Increase the bias as used under "Video IF Alignment" to -9 volts.
Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Direct	High side to point (A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel.	Vert. amp. to point (B). Low side to chassis.	A7, A8	Disconnect stabilizing capacitor (C3). Adjust for curve of maximum amplitude and symmetry as in Fig. 2.
7.	"	"	"	"	"	Vert. amp. to point (C). Low side to chassis.	A9	Reconnect stabilizing capacitor (C3). Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 3. SLIGHTLY retouch A8 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

Tune in a TV station and examine the picture for evidence of 4.5MC beat interference. If necessary, adjust A10 to the point of minimum interference.

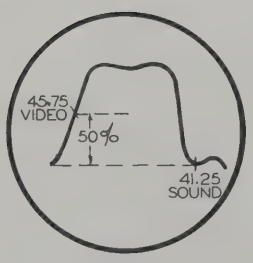

FIG. 1

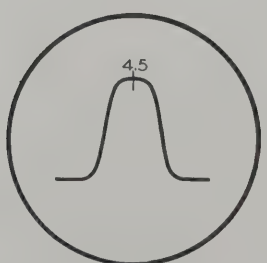

FIG. 2

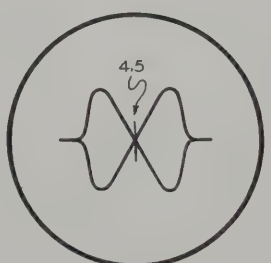

FIG. 3

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ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Connect a 3 volt bias as under "Video IF Alignment".
V7 should remain out of its socket.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω carbon resistors.	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211. 25MC 215. 75MC	13	Vert. amp. thru 47KΩ to point (A). Low side to chassis.	A11	Adjust to place sound marker in trap notch as in Fig. 4. Video should be at 50%.
9.	"	"	207MC (10MC Swp)	205. 25MC 209. 75MC	12	"		Check high band channels for sound marker placement as in Fig. 4. If necessary, make slight compromise adjustment of A11 for best marker placement on all high band channels.
			201MC (10MC Swp)	199. 25MC 203. 75MC	11			
			195MC (10MC Swp)	193. 25MC 197. 75MC	10			
			189MC (10MC Swp)	187. 25MC 191. 75MC	9			
			183MC (10MC Swp)	181. 25MC 185. 75MC	8			
			177MC (10MC Swp)	175. 25MC 179. 75MC	7			
10.	"	"	85MC (10MC Swp)	83. 25MC 87. 75MC	6	"	A12	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should be at 50%.
11.	"	"	79MC (10MC Swp)	77. 25MC 81. 75MC	5	"		Check low band channels for sound marker placement as in Fig. 4. If necessary, make slight compromise adjustment of A12 for best marker placement on all low band channels.
			69MC (10MC Swp)	67. 25MC 71. 75MC	4			
			63MC (10MC Swp)	61. 25MC 65. 75MC	3			
			57MC (10MC Swp)	55. 25MC 59. 75MC	2			

RF AND MIXER ALIGNMENT

Connect a 3 volt bias as under "Video IF Alignment".
V7 should remain out of its socket.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205. 25MC 209. 75MC	12	Vert. amp. thru 10KΩ to point (E). Low side to chassis.	A13, A14	Adjust for maximum response similar to Fig. 5.
13.	"	"	213MC (10MC Swp)	211. 25MC 215. 75MC	13	"		Check for response similar to Fig. 5. If markers fall below 70% on any channel, make compromise adjustments of A13 and A14 with channel switch set to that channel. Then recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199. 25MC 203. 75MC	11			
			195MC (10MC Swp)	193. 25MC 197. 75MC	10			
			189MC (10MC Swp)	187. 25MC 191. 75MC	9			
			183MC (10MC Swp)	181. 25MC 185. 75MC	8			
			177MC (10MC Swp)	175. 25MC 179. 75MC	7			
			85MC (10MC Swp)	83. 25MC 87. 75MC	6			
			79MC (10MC Swp)	77. 25MC 81. 75MC	5			
			69MC (10MC Swp)	67. 25MC 71. 75MC	4			
			63MC (10MC Swp)	61. 25MC 65. 75MC	3			
			57MC (10MC Swp)	55. 25MC 59. 75MC	2			

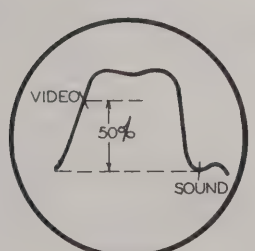


FIG4

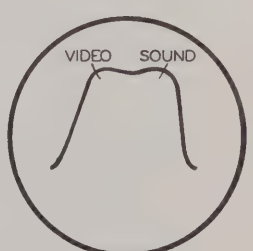
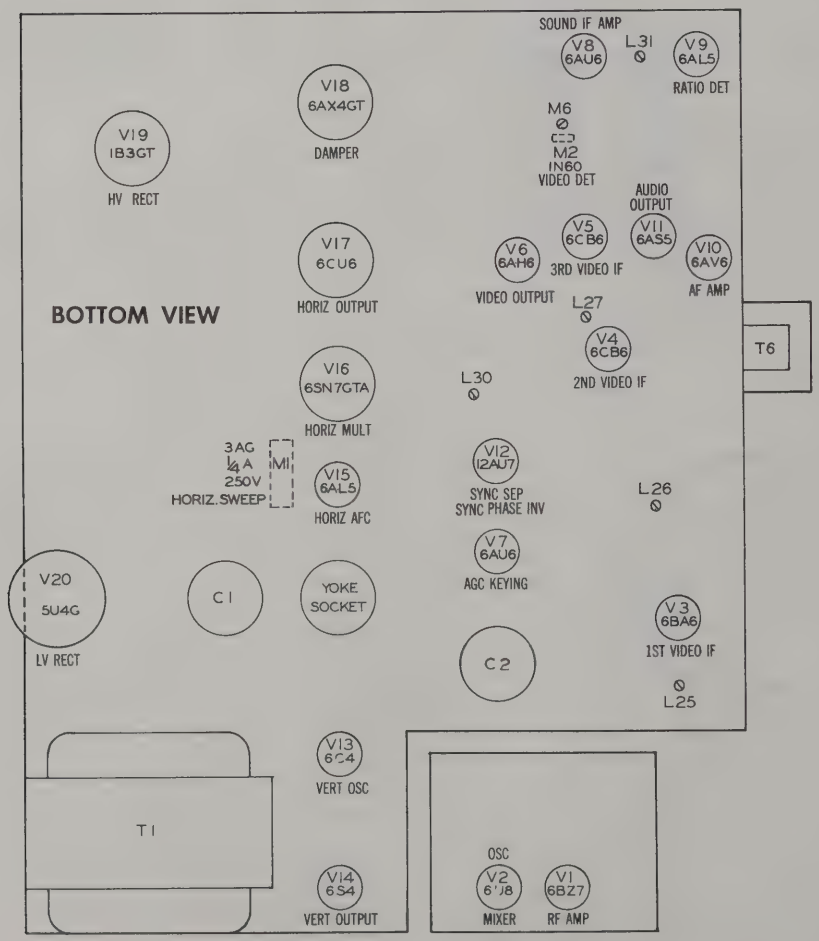


FIG. 5

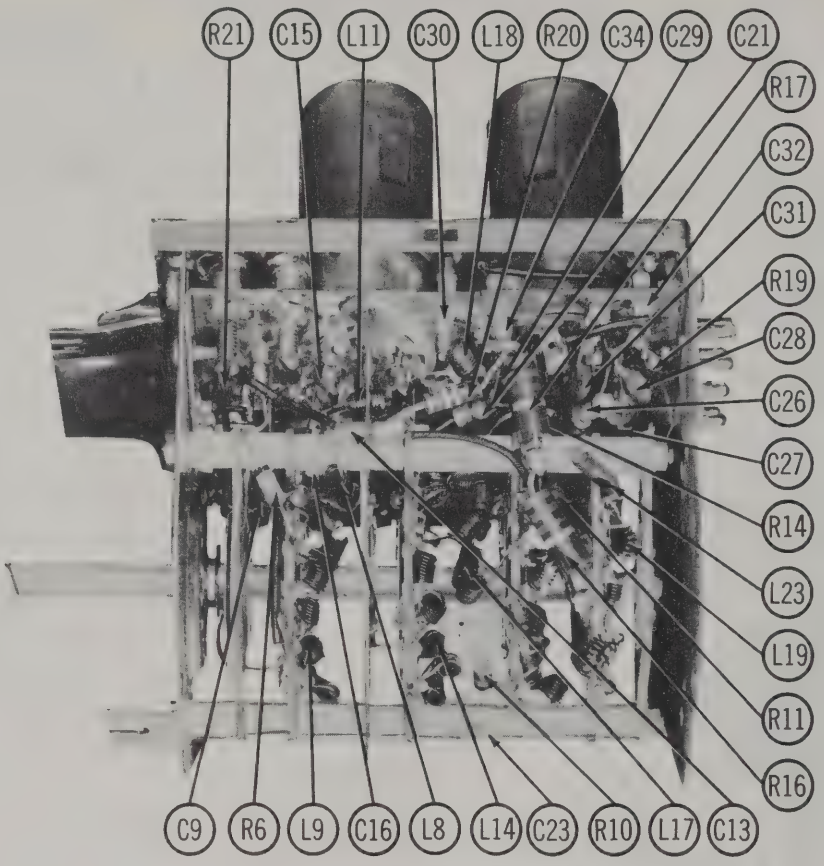
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	†2.7KΩ	†440KΩ	INF	.1Ω	0Ω	INF	200KΩ	0Ω	0Ω
V 2	6U8	▲2.4KΩ	480KΩ	▲15KΩ	.1Ω	0Ω	▲1.2KΩ	0Ω	0Ω	15KΩ
V 3	6BA6	20KΩ	INF	20KΩ	20KΩ	†200Ω	†200Ω	■68Ω		
V 4	6CB6	100KΩ	47Ω	0Ω	.1Ω	■220Ω	■220Ω	0Ω		
V 5	6CB6	.1Ω	150Ω	.1Ω	0Ω	▲220Ω	▲220Ω	0Ω		
V 6	6AH6	4.7KΩ	0Ω	0Ω	.1Ω	†6.5KΩ	20KΩ	40Ω		
V 7	6AU6	†36KΩ	†55Ω	20KΩ	20KΩ	100KΩ	◓68KΩ	†55Ω		
V 8	6AU6	4Ω	0Ω	0Ω	.1Ω	▲150Ω	▲150Ω	150Ω		
V 9	6AL5	INF	INF	0Ω	.1Ω	0Ω	0Ω	12KΩ		
V 10	6AV6	10Meg	0Ω	0Ω	.1Ω	0Ω	0Ω	†270KΩ		
V 11	6AS5	20KΩ	400KΩ	20KΩ	20KΩ	400KΩ	†350Ω	†540Ω		
V 12	12AU7	▲1Meg	2.2Meg	22KΩ	0Ω	0Ω	▲15KΩ	▲1Meg	3.3KΩ	.1Ω
V 13	6C4	◓2.5Meg	NC	.1Ω	0Ω	◓2.5Meg	2Meg	0Ω		
V 14	6S4	NC	680Ω	1.5Meg	.1Ω	0Ω	1.5Meg	INF	INF	◓7KΩ
V 15	6AL5	4.7KΩ	4.7KΩ	0Ω	.1Ω	4.8Meg	0Ω	4.8Meg		
V 16	6SN7GTA	5Meg	†5.6KΩ	1.2KΩ	80KΩ	†120KΩ	1.2KΩ	.1Ω	0Ω	
V 17	6CU6	NC	.1Ω	NC	†15KΩ	470KΩ	TP	0Ω	47Ω	Top Cap ◓10.5Ω
V 18	6AX4GT	NC	NC	250KΩ	NC	†55Ω	TP	20KΩ	20KΩ	
V 19	1B3GT		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			Top Cap ◓420Ω
V 20	5U4G	NC	90KΩ	TP	3Ω	NC	29Ω	NC	90KΩ	
V 21	21XP4A	0Ω	†900KΩ	Pin 6 †55Ω	Pin 10 ◓9.5Ω	Pin 11 †210KΩ	Pin 12 .1Ω			

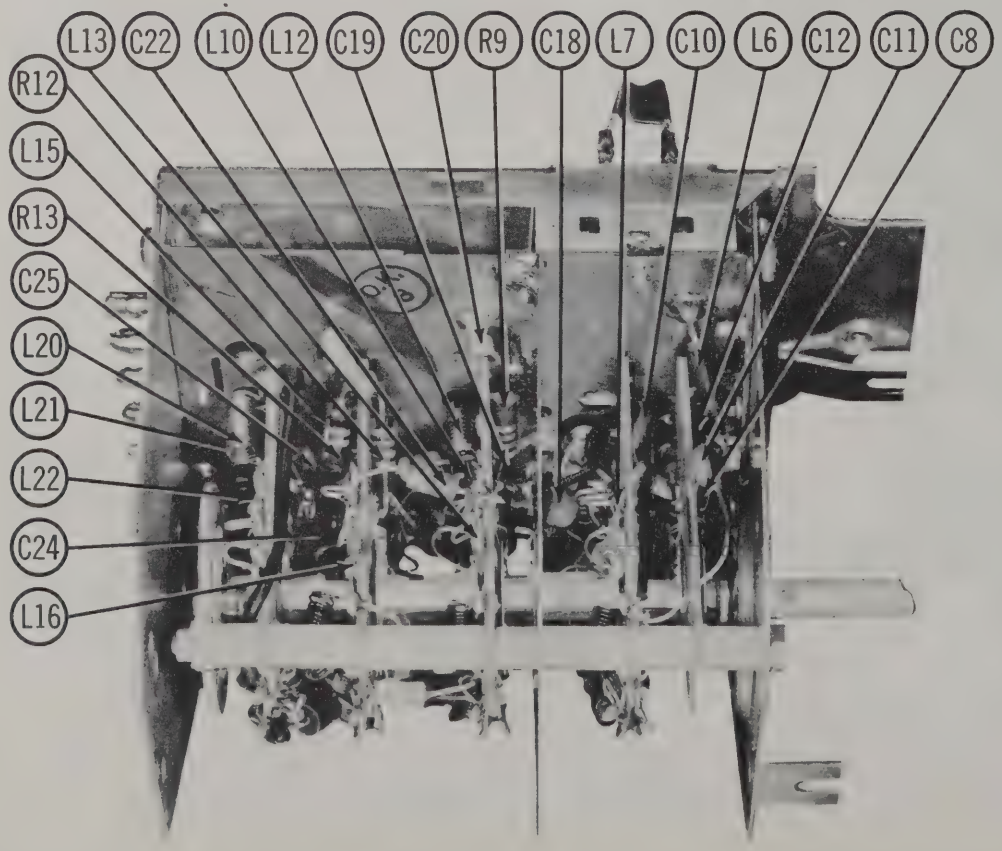
† MEASURED FROM PIN 2 OF V20.
▲ MEASURED FROM 135V LINE.
■ MEASURED FROM PIN 2 OF V3.
◓ MEASURED FROM PIN 3 OF V18.
NC - NO CONNECTION
TP - TIE POINT



TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

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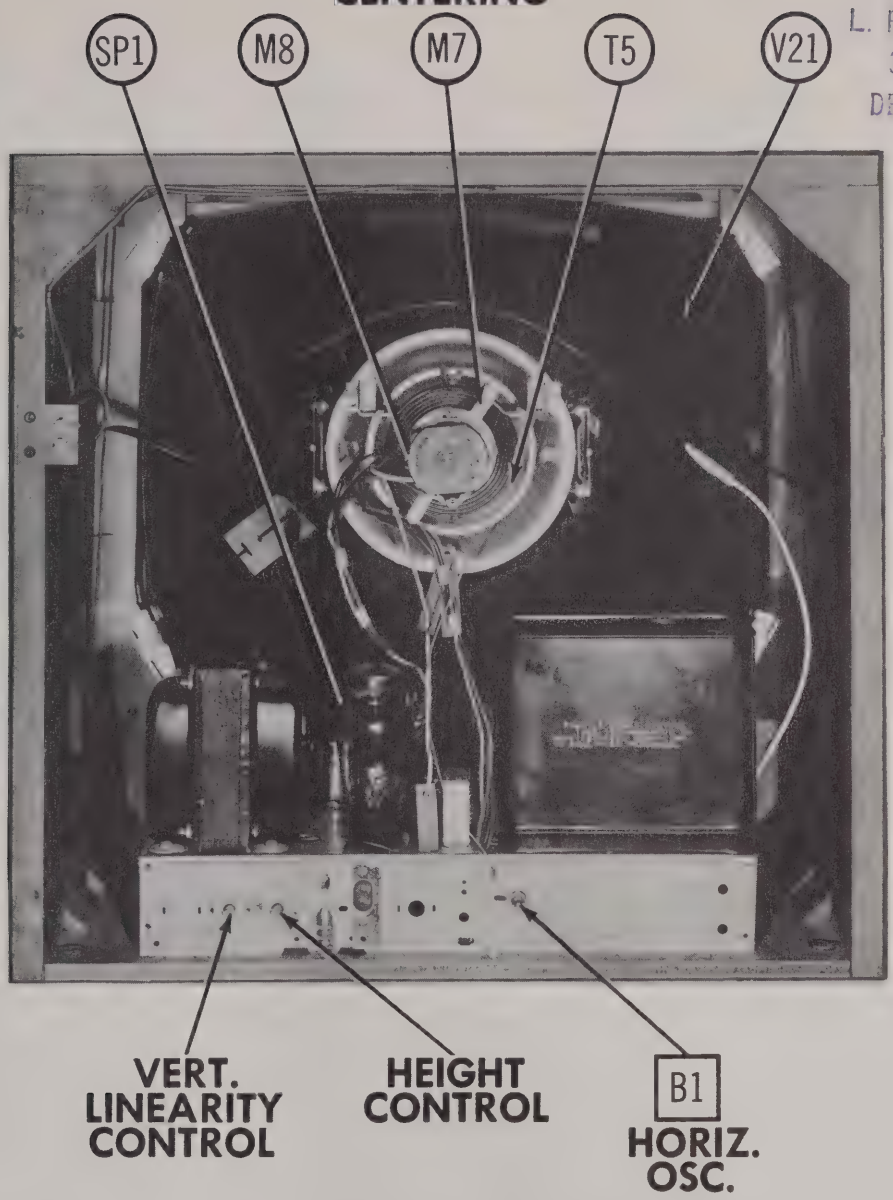


CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Set the horizontal hold control at the mid-position of its range.

Set the contrast control for normal operation.

Adjust the horizontal oscillator slug (B1) until the picture synchronizes horizontally.

Turn the horizontal hold control to each extreme end of its rotation to see that the sync range is centered.

If necessary, slight readjustment of B1 should give the desired effect.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V17, V18 and V20. Check C71, C72, R84, R85, R89, T3, T5A and other associated components.

DRIVE LINES

Check by substitution V17 and V18. Check C71, C72, R85, R89, T3, T5A and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V17 and V18. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V16, V17 and V18. Check C68 for open. Check L32, C67, C69, R80, R82 and other associated components.

XMAS TREE EFFECT

Check by substitution V16, V17 and V18. Check T3 and T4 for internal arcing. Check L32, C69, C66, R76, R81, R83 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V13 and V14. Check waveform W9.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R73, R72, R71, C1C, C2A and other associated components.	Check T2, C61, C63, R68, R5 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V13 and V14. Check height and vertical linearity controls for proper operation. Check R68, T4 and other associated components.

COMPRESSED AT BOTTOM

Check by substitution V13 and V14. Check R5, R68, R72, R71, R73, T2, C63 and other associated components.

COMPRESSED AT TOP

Check by substitution V13 and V14. Check R4, R70, R71, C2A, C63, T4, T5B and other associated components.

FOLDS

Check by substitution V13 and V14. Check C61, C60, C63, R69, R71, T4, T5B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Substitute V12. Check C54, C55, C56, R65, R64, R62, R60 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V13. Check vertical integrator network. Check R3A, T2 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V15 and V16. Check C64, C65, C67, C68, C70, R80, R81, R83 and other associated components.

HORIZONTAL BENDING

Check by substitution V12, V15 and V16. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V6. Check C43, R38, R39 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A10. Check video IF alignment.

POOR CONTRAST

Substitute V6. Check contrast control. Check R37, L28, L29, C43, C44 and other associated components.

NEGATIVE PICTURE

Substitute V6. Check picture tube. Check video crystal detector network. Check L28, L29, C43 and other associated components.

SMEAR

Substitute V6. Check video crystal detector network. Check L28, L29, C43 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5 and V6 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9, V10 and V11. Check stages V10 and V11 using audio signal generator. Apply audio signal across R1.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C50, C51, C52, C4, R57, R54, R55, T6, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A9 for minimum buzz. If still unsatisfactory, check C3 and audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

POWER

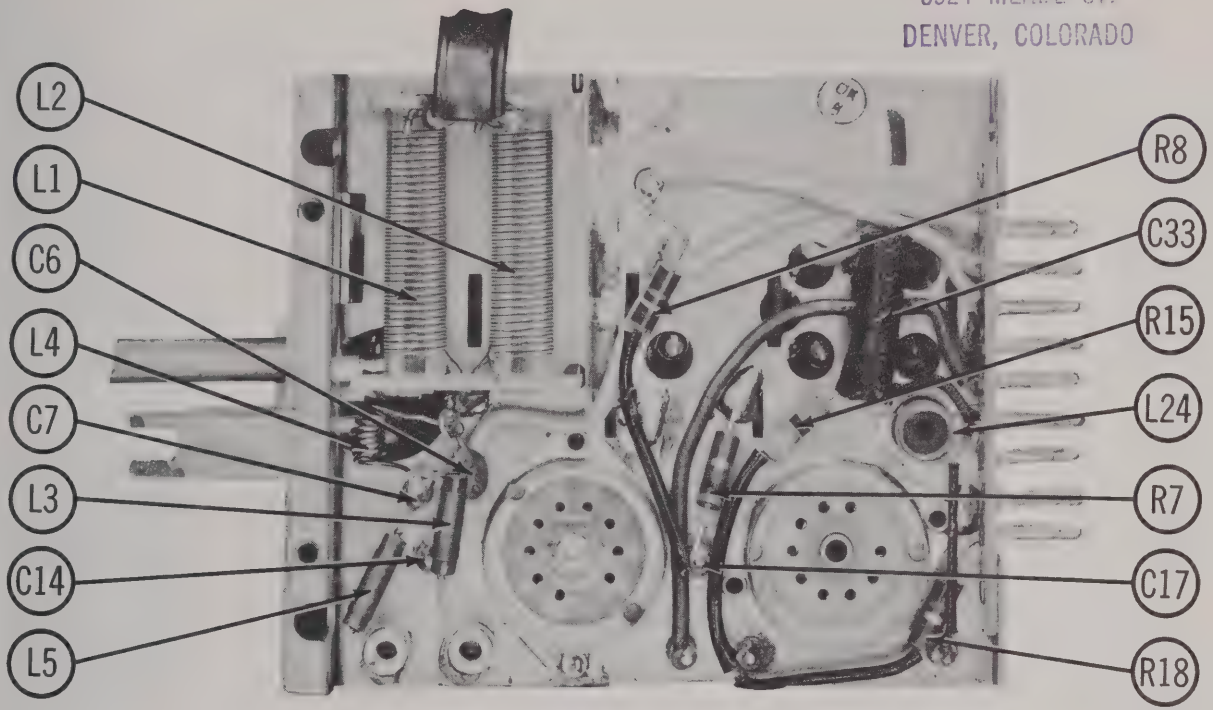
DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, check yoke plug. It must be connected. Substitute V20. Check B+ filter and decoupling network.

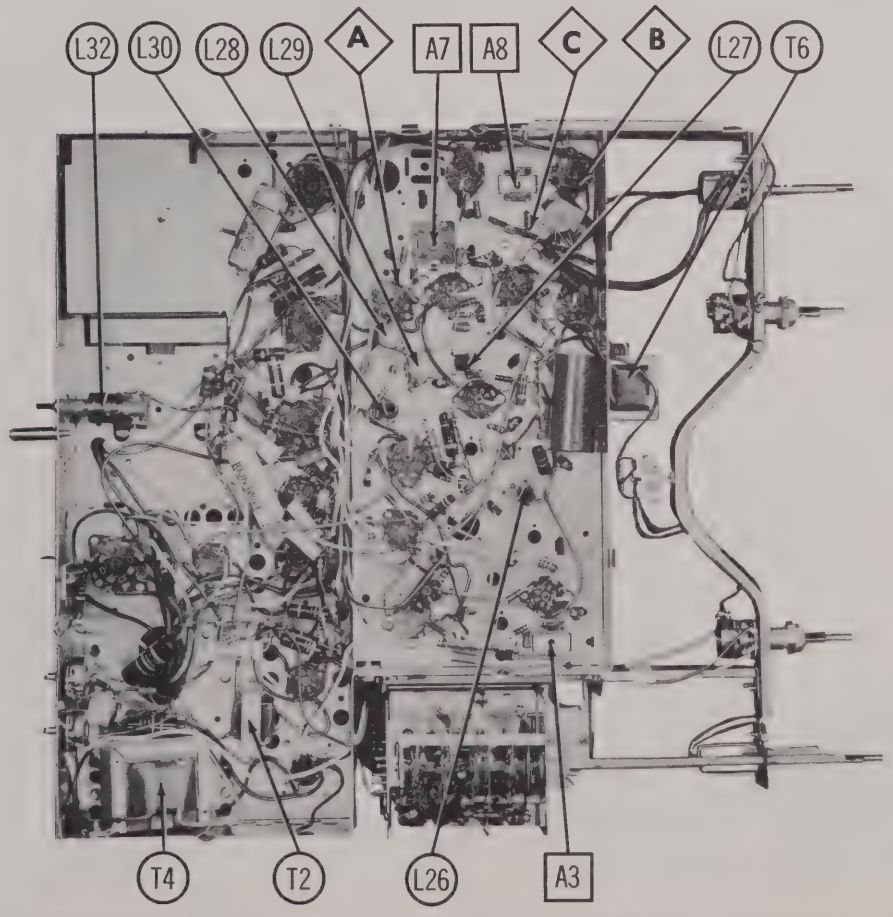
SMALL AND/OR DIM PICTURE

Substitute V20. Check B+ filter and decoupling network.

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



RF TUNER-TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No	USE	REPLACEMENT DATA: BENDIX PART No	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BZ7	6BZ7	9AJ	
V2	Osc.-Mixer	6U8	6U8	9AE	
V3	1st. Video IF Amp.	6BA6	6BA6	7BK	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Output	6AU6	6AU6	7BK	
V7	AGC Keying	6AU6	6AU6	7BK	
V8	Sound IF Amp.	6AU6	6AU6	7BK	
V9	Ratio Detector	6AL5	6AL5	6BT	
V10	AF Amplifier	6AV6	6AV6	7BT	
V11	Audio Output	6AB5	6AB5	7CV	
V12	Sync Separator-Sync Phase Inv.	12AU7	12AU7	9A	
V13	Vert. Osc.	6C4	6C4	9BC	
V14	Vert. Output	6B4	6B4	9AC	
V15	Horiz. AFC	6AL5	6AL5	6BT	
V16	Horiz. Mult.	6SN7GTA	6SN7GTA	9BD	
V17	Horiz. Output	6CU8	6CU8	6AM	
V18	Damper	5AX4GT	5AX4GT	4CG	
V19	HV Rectifier	1B3GT	1B3GT	8C	
V20	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No	REPLACEMENT DATA: BENDIX PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V21	21XP4A 21XP4	21XP4A 21XP4		21XP4A 21XP4		18L	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No	RATING: CAP.	VOLT	REPLACEMENT DATA: BENDIX PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1A	±80	350	267005-15			FP375.5		TM-8040-450	D-255
B	±40	350						TM-8040-350	FM-4560
C	±40	450						TD-40-350	
C3A	±100	50	267016-5					TM-3005	D-323
B	±100	300							
C3	10	50	267024-26			TC32		TD-10-50	FM-0510
C4	40	300	267024-28			TC78		TD-40-350	FM-4540
C5	3	50	267024-27			TC368		TD-3-50	MMT-0505
C6	150			D6-181		UC-5315			
C7	15								
C8	15								
C9	33			D6-330	GP2K-330	UC-5432			
C10	6.8			TCZ-6.8	NP0A-6R8	ZT-5568			
C11	1000			DD-102	501-001	DC-521			
C12	6.8			TCZ-6.8	NP0A-6R8	ZT-5568			
C13	1000			MFT-1000					
C14	1000			MFT-1000					
C15	4								
C16	2.7								
C17	1000			MFT-1000					
C18	1000			DD-102	501-001	DC-521			
C19	1000			DD-102	501-001	DC-521			
C20	1000			MFT-1000					
C21	.3								
C22	.56								
C23	.91								
C24	15			D6-150	GP1K-150	UC-5415			
C25	1.5								
C26	1.5			TCZ-1.5	NP0A-1R5	ZT-5515			
C27	10								
C28	10								
C29	1000			DD-102	501-001	DC-521			
C30	1000			MFT-1000					
C31	1000			DD-102	501-001	DC-521			
C32	5								
C33	82								
C34	1000			MFT-1000					
C35	680		CC22Z5Y5S81M	D6-681	GP2K-681	UC-5368			K-1368
C36	680		CC22Z5Y5S81M	D6-681	GP2K-681	UC-5368			K-1368
C37	680		CC22Z5Y5S81M	D6-681	GP2K-681	UC-5368			K-1368
C38	680		CC22Z5Y5S81M	D6-681	GP2K-681	UC-5368			K-1368
C39	680		CC22Z5Y5S81M	D6-681	GP2K-681	UC-5368			K-1368
C40	680		CC22Z5Y5S81M	D6-681	GP2K-681	UC-5368			K-1368
C41	680		CC22Z5Y5S81M	D6-681	GP2K-681	UC-5368			K-1368
C42	680		CC22Z5Y5S81M	D6-681	GP2K-681	UC-5368			K-1368
C43	.047	400	267036-473	DF-503			PT4147	1N4-847	3304147
C44	.82	500		TCZ-82	NP0L-820				KR-1482
C45	3000		267066-302	DD-302	SU-303				C-1330
C46	10000		CC23Z2Z102SP	DD-103	501-101				
C47	1000		CC22Z2Z102SP	D6-102	GP2L-102	UC-521			K-1310
C48	2700		267072-272	DD-272	GP2-333-272	UC-5327			C-1327
C49A	2200		†274294-1	D6-222	GP2-333-222	UC-5222	IMP6-D22		C-1222
B	2200			D6-222	GP2-333-222	UC-5222	IMP6-D22		C-1222
C50	.047	200	267056-473	DF-503			PT4147	IMP2-847	3302147
C51	.01	400	267036-103	D6-103	GP2-333-103		PT4U	IMP4-S1	3304U1
C52	.015	400	267036-153				PTE15	IMP4-S15	3304L15
C53	680		CC22Z5Y5S81M	D6-681	GP2K-681	UC-5368			K-1368
C54	.0047	400	267036-472	D6-472	GP2-333-472	PT2347	IMP6-D47		3306347
C55	220		CC22Z5Y5S2R1M	D6-221	GP2K-221	UC-5321			K-1321
C56	.047	200	267056-473	DF-502			PT4147	IMP2-847	3302147
C57	.0047	400	267036-472	D6-472	GP2-333-472	PT2347	IMP6-D47		3306347
C58	.0047	400	267036-472	D6-472	GP2-333-472	PT2347	IMP6-D47		3306347
C59	.0047	400	267036-472	D6-472	GP2-333-472	PT2347	IMP6-D47		3306347
C60	.047	600	267060-473						

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No	RATING: CAP	VOLT	REPLACEMENT DATA: BENDIX PART No	CENTRALAB PART No	ERIE PART No	MALLORY PART No	PYRAMID PART No	SANGAMO PART No	NOTES
C61	.047	400	267036-473	DF-503			IMP4-347	3304147	
C62	470		CC22Z5Y5V471M	D6-471	GP2K-471	UC-5347		K-1347	
C63	.022	600	267060-223	DF-223	417-02	PT2123	IMP6-S22	3308123	
C64	.001	400	267036-102	D6-102	GP2L-102	PT521	IMP6-D1	330621	
C65	.001	400	267036-102	D6-102	GP2L-102	PT521	IMP6-D1	330621	
C66	.047	400	267036-473	DF-503		PT4147	IMP4-847	3304147	Note 1
C67	.0047	400	267036-472	D6-472	GP2-333-472	PT2347	IMP6-D47	3306247	
C68	.047	300	267056-473	DF-503		PT4147	IMP3-847	3303147	
C69	3900	500	CM24Z392K			MC3923		CR-1339	
C70	390	500	CM22Z391K			MC3843		KR-1339	
C71	680	500	CM24Z681K					KR-1368	
C72	.0047	400	267036-473	D6-473	GP2-333-472	PT2347	IMP6-D47	3306247	
C73	.047	400	267036-473	DF-503		PT4147	IMP4-847	3304147	
C74	.1	800	267055-104	DF-104		PT391	IMP6-P1	330601	
C75	.1	800	267055-104	DF-104		PT391	IMP6-P1	330601	
C76	11	2000							Note 2

Note 1. Not used in some versions.
Note 2. Some versions use 47kMF in this application.
† Items C49A, C49B, R51 are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: BENDIX Part No.	IRC Part No.	CLAROSTAT Part No.	CENTRALAB Part No.	MALLORY Part No.	INSTALLATION NOTES
R1A	500KΩ	½	CH52016-5	Q13-133	A47-500K-Z	B-80-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		76-1	Not Req.	SWE-13	Not Req.	UB-26	Attach to R1A
R2A	250KΩ	½	LH52045-6	*Q4-673		F1-34		Brightness - Panel
B	1250Ω	½				R2-7		Contrast - Rear
R3A	2MEg	½	LH53049-2	**Q7-674	RTV-496	F1-67	UF2GL	Vert. Hold - Panel
B	30KΩ	½				R2-27	UR54L	Horiz. Hold - Rear
R4A	1MEg	½	CH52025-28	Q11-137	A47-1MEg-S	A3-69	SU-54	Vert. Linearity
B	Shaft		Not Req.	RQ	FS3-1/4	AK-1	Not Req.	Attach to R4A
R5A	3MEg	½	CH52025-27	Q11-140	A47-3MEg-S	A3-94	SU-59	Height
B	Shaft		Not Req.	RQ	FS3-1/4	AK-1	Not Req.	Attach to R5A

* CONCENTRIKIT EQUIVALENT: KIT K-4, BASE ELEMENTS & SHAFTS: BU-130 & P1-121 (PANEL)
BU7-305 & RI-208 (REAR)
** CONCENTRIKIT EQUIVALENT: KIT K-4, BASE ELEMENTS & SHAFTS: BU-130 & P1-121 (PANEL)
BU-121 & RI-208 (REAR)

RESISTORS

ITEM No.	RATING: OHMS	WATTS	REPLACEMENT DATA: BENDIX Part No.	IRC Part No.	NOTES
R6	100KΩ	½		BTS-100K	
R7	1MEg 5%	½		BTS-1Meg 5%	
R8	750KΩ 5%	½		BTS-750K 5%	
R9	470Ω	½		BTS-470	
R10	10KΩ	½		BTS-10K	
R11	680Ω	½		BTS-680	
R12	470KΩ	½		BTS-470K	
R13	10KΩ	½		BTS-10K	
R14	10KΩ	½		BTS-10K	
R15	1000Ω	½		BTS-1000	
R16	2200Ω	½		BTA-2200	
R17	2300Ω	1		BTA-2300	
R18	100Ω	½		BTS-100	
R19	15KΩ	½		BTS-15K	
R20	150KΩ	½		BTS-150K	
R21	56Ω	½		BTS-56	
R22	100KΩ	½	RC23A104K	BTS-100K	
R23	2200Ω	½	RC24A222K	BTA-2200	
R24	150Ω	½	RC23A151K	BTS-150	
R25	12KΩ 5%	½	RC23A123J	BTS-12K 5%	
R26	1200Ω	½	RC23A122K	BTS-1200	
R27	68Ω	½	RC23A680K	BTS-68	
R28	33KΩ 5%	½	RC23A333J	BTS-33K 5%	
R29	150Ω	½	RC23A151K	BTS-150	
R30	680Ω	½	RC23A681K	BTS-680	
R31	470Ω	½	RC23A470K	BTS-47	
R32	220Ω	½	RC23A221K	BTS-220	
R33	22KΩ 5%	½	RC23A223J	BTS-22K 5%	
R34	150Ω	½	RC23A151K	BTS-150	
R35	220Ω	½	RC23A221K	BTS-220	
R36	100Ω	½	RC23A101K	BTS-100	
R37	820Ω	½	RC23A821K	BTS-820	
R38	3300Ω	1	RC24A332K	BTA-3300	
R39	3300Ω	½	RC23A332K	BTS-3300	
R40	33KΩ	½	RC23A333K	BTS-33K	
R41	33KΩ	½	RC23A333K	BTS-33K	
R42	470KΩ	½	RC23A474K	BTS-470K	
R43	470KΩ	½	RC23A474K	BTS-470K	
R44	820KΩ	½	RC23A824K	BTS-820K	
R45	120KΩ	½	RC23A124K	BTS-120K	
R46	330KΩ	½	RC23A334K	BTS-330K	
R47	68KΩ	½	RC23A683K	BTS-68K	
R48	150Ω	½	RC23A151K	BTS-150	
R49	150Ω	½	RC23A151K	BTS-150	

ITEM No.	RATING: OHMS	WATTS	REPLACEMENT DATA: BENDIX Part No.	IRC Part No.	NOTES
R50	180Ω	½	RC23A181K	BTS-180	
R51	47KΩ	½	†274294-1	BTS-47K	
R52	33KΩ	½	RC23A333K	BTS-33K	
R53	10Meg	½	RC23A106K	BTS-10Meg	
R54	270KΩ	½	RC23A274K	BTS-270K	
R55	820KΩ 5%	½	RC23A824J	BTS-820K 5%	
R56	750KΩ 5%	½	RC23A754J	BTS-750K 5%	
R57	270Ω	½	RC23A271K	BTA-270	
R58	150KΩ	½	RC23A154K	BTS-150K	
R59	2.2MEg	½	RC23A225K	BTS-2.2Meg	
R60	22KΩ	½		BTS-22K	Note 1
R61	18KΩ	½	RC23A183K	BTS-18K	
R62	1MEg	½	RC23A106K	BTS-1Meg	
R63	3300Ω	½	RC23A332K	BTS-3300	
R64	10KΩ	½	RC23A103K	BTS-10K	
R65	5600Ω	½	RC23A562K	BTS-5600	
R66	22KΩ	½	RC23A223K	BTS-22K	
R67	33KΩ	½	RC23A333K	BTS-33K	
R68	1.2MEg	½	RC23A125K	BTS-1.2Meg	
R69	4700Ω	½	RC23A472K	BTS-4700	
R70	1.5MEg	½	RC23A155K	BTS-1.5Meg	
R71	680Ω	1	RC24A681K	BTA-680	
R72	3300Ω	½	RC23A332K	BTS-3300	
R73	3300Ω	3	RC23A332K	BTB-3300	
R74	1000Ω	½		BTS-1000	
R75	1000Ω	3		BTB-1000	
R76	4700Ω	½		BTS-4700	Note 2
R77	100KΩ	½	RC23A104K	BTS-100K	
R78	100KΩ	½	RC23A104K	BTS-100K	
R79	4.7MEg	½	RC23A475K	BTS-4.7Meg	
R80	470KΩ	½	RC23A474K	BTS-470K	
R81	1200Ω	½	RC23A122K	BTS-1200	
R82	5600Ω	1	RC24A568K	BTA-5600	
R83	68KΩ	½	RC23A683K	BTS-68K	
R84	120KΩ	½	RC23A124K	BTS-120K	
R85	4700Ω	½	RC23A472K	BTS-4700	
R86	470KΩ	½	RC23A474K	BTS-470K	
R87	100Ω	½	RC23A101K	BTS-100	
R88	47Ω	1	RC24A470K		
R89	15KΩ	2	RC25A153K	BTB-15K	
R90	47Ω	2	RC25A150K		
R91	6.8Ω	3	268000-068		
R92	220KΩ	1	RC24A224K	BTA-220K	
R93	4.7Ω	3	268000-047		

† Items R51, C49A and C49B are combined in one unit.
Note 1: Some versions use a 220Ω resistor in this application.
Note 2: Not used in some versions.

TRANSFORMER (POWER)

ITEM No	RATING: PRI	SEC 1	SEC 2	SEC 3	SEC 4	SEC 5	REPLACEMENT DATA: BENDIX PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Stancor PART No	Thordarson PART No	Triad PART No
T1	117VAC ±1.3A	546 VCT ±70ADC	5VAC ± 3A	6.3VAC ± 2.5A	6.3VAC ± 6.4A		265048-8						

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA: BENDIX PART No.	Halldorson PART No.	Merit PART No.	RCA PART No.	Ram PART No.	Stancor TYPE No.	Thordarson PART No.	Triad PART No.
T2	Vert. Osc. Trans.	265094-2	B6702	A-3003	2097[1]	V405	A-8125	26A03	A-97X
T3	Horiz Output Trans.	265095-2	FB41[4] & MWC-1[4]	HV0-9 & RF800*[4]	2327[1]	X1109	A-8254*[4]	26L7-37*	D-359*[4]
T4	Vert. Output Trans.	265072-9	Z1803	A-3036	2047[2]	V309	A-8182	26B5L	A-99X[4]
T5A	Yoke-Horiz.(68MH)	265096-2[3]	DF805[3]	MD3-1323[3]	2220[3]	Y70718/43	DY-11A[3]	26Y5	Y-22-1[4]
B	Yoke-Horiz. Vert.(40MH)								

① Drill new mounting hole(s).
② Includes C75, R74, R75, plug and centering device.
③ Use original rear cover and centering device.
④ Use original yoke damping network.
⑤ Refer to instructions packed with unit pertaining to damping network.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	R	HV Rect. Plate Lead	HV Rect. Plate Lead	HV Rect. Plate Lead	HV Rect. Plate Lead	HV Rect. Plate Lead	HV Rect. Plate Lead	HV Rect. Plate Lead
	6	9	9	10	13	5	13	10
	3	7	7	7	Jumper 10 & 6	4	Jumper 13 & 6	7
	1	1	1	3	3	3	3	3
	9	Term #3 of RF800	Orange Term of MWC-1	2	9	2	9	2
	10	Term #4 of RF800	Black Term of MWC-1	1	8	1	8	1
Connect Width Coil Across		Terms #1 & #2 of RF800 across "7 & 1"	Red & Blue Terms of MWC-1 across "7 & 1"					
Special Note:		6	6					7

① If AGC does not function properly, reverse width coil primary or secondary.
② Jumper terms #9 and "7".

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE: PRI	SEC	REPLACEMENT DATA: BENDIX PART No	Halldorson PART No	Merit PART No	Stancor PART No	Thordarson PART No	Triad PART No	NOTES
T6	3.2KΩ	3.4Ω	265092-5	Z1001[1]	A-3018	A-3849	26S50	S-4X	① Drill one new mounting hole

SPEAKER

ITEM No	RATINGS: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: BENDIX PART No.	QUAM PART No.	NOTES
SP1	4" X 6"	PM	3.4Ω	256030-3 ①	4A5I	① Used in models TS21E & TS21EU
	4"	PM	3.4Ω	256017-5 ②	4A1	② Used in models TS21E & TS21EU
	6"	PM	3.4Ω	25x004-2 ③	6A1	③ Used in models KS21E & KS21EU
	10"	PM	3.4Ω	256012-4 ④	10A3I	④ Used in models KS71E & KS71EU

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: BENDIX Part No.	MEISSNER Part No.	MERIT Part No.	MILLER Part No.	NOTES
L1	VHF ant. Match Trans	.6Ω	.6Ω					
L2	VHF Ant. Match Trans.	.6Ω	.6Ω					
L3	IF Trap	.2Ω						
L4	IF Coil	0Ω						
L5	FM Trap	.2Ω						
L6	UHF IF Input Coil	1.5Ω						
L7	VHF Ant. Coils	0Ω						
L8	VHF Ant. Coil	0Ω						Channel 13
L9	UHF IF Coil	0Ω						
L10	Pil. Choke	0Ω						
L11	Mixer Coil	0Ω						
L12	VHF RF Coil	0Ω						Channel 13
L13	VHF RF Coils	0Ω						
L14	UHF IF Coil	0Ω						
L15	VHF Mixer Grid Coil	0Ω						Channel 13
L16	VHF Mixer Grid Coils	0Ω						
L17	UHF IF Coil	0Ω						
L18	Pil. Choke	0Ω						
L19	VHF Osc. Coils	0Ω						
L20	VHF Osc. Coil	0Ω						Channel 6

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PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA BENDIX PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L21	VHF Osc. Coil	0Ω						Channel 13
L22	RF Coil	0Ω						
L23	RF Choke	1.5Ω						
L24	Conv. Plate	.1Ω						
L25	1st. Video IF	.2Ω		259157-2	17-5002 *	TV-127 *	6232 *	Includes 41.25MC trap
L26	2nd. Video IF	.1Ω	.1Ω	259144-1	17-4523	TV-130	6219	
L27	3rd. Video IF	.1Ω	.1Ω	259145-2	17-4522	TV-130	6219	
L28	Series Peaking Coil	14Ω		259120-8	19-4400 ■	TV-190 ■	6155 ■	342 Microhenries, wound on 33KΩ resistor
L29	Shunt Peaking Coil	14Ω		259120-7	19-4400 ▲		4566 ▲	420 Microhenries, wound on 18KΩ resistor
L30	4.5MC Trap	.8Ω		259108-2	20-1004	TV-151	1469	
L31	Ratio Det.	7.5Ω	1.3ΩCT	259156-2	17-3497	TV-115	6205	Tertiary winding -.7Ω
L32	Horiz. Osc.	46Ω		259121-1	17-1576	TV-163	6210	

* Use one winding only.
■ Parallel with 33KΩ resistor.
▲ Parallel with 18KΩ resistor.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA BENDIX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L33	.170A	55. 8Ω	1.17HY	265093-3	C5040	C-2994	C-2325①	26C43①	C-21X①

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA BENDIX PART No. FUSE	BENDIX PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	1/4A 250V	266169-251	266193	312. 250 (3AG-1/4A)	357001	AGC 1/4	4405

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA BENDIX PART No.	SYLVANIA PART No.		NOTES
M2	1N60	250601-1	1N60 or 1N132		Video Det.

MISCELLANEOUS

ITEM No.	PART NAME	BENDIX PART No.	NOTES
M3	Dial Light	253000-1	#47
M4	Tuner	258061-5	VHF- All models
M5	Tuner		UHF - Models TS21EU, KS21EU, TSF21EU, KST21EU only
M6	Video Det. Assy.	259159-1	Includes M2, coils, capacitors and resistors
M7	Centering Device		Part of yoke cover
M8	Ion Trap	274197-11	
	Cabinet	255162-1	Models TS21E, TS21EU
	Cabinet	255162-2	Models TSF21E, TSF21EU
	Cabinet	255163-1	Models KS21E, KS21EU
	Cabinet	255164-1	Models KST21E, KST21EU
	Knob	269124-2	Contrast, Horiz. Hold-Models TS21E, KS21E, TS21EU, KS21EU
	Knob	269107-1	Contrast, Horiz. Hold-Models TSF21E, TSF21EU
	Knob	269107-2	Contrast, Horiz. Hold-Models KST21E, KST21EU
	Knob	269108-1	Brightness and Vert. Hold -Models TS21E, KS21E, TSF21E, TS21EU, KS21EU, TSF21EU
	Knob	269108-2	Brightness and Vert. Hold - Models KST21E, KST21EU
	Knob	269111-1	VHF Fine Tuning - Models TS21E, KS21E, TSF21E, TS21EU, KS21EU, TSF21EU
	Knob	269111-2	VHF Fine Tuning - Models KST21E, KST21EU
	Knob	269112-1	VHF Channel Sel.-UHF Prism-Model TSF21EU
	Knob	269112-2	VHF Channel Sel.-UHF Prism-Models TS21EU, KS21EU
	Knob	269112-3	VHF Channel Sel.-UHF Prism-Model KST21EU
	Knob	269115-1	VHF Channel Sel.-Model TSF21E
	Knob	269115-2	VHF Channel Sel.-Models TS21E, KS21E
	Knob	269115-3	VHF Channel Sel.-Model KST21E
	Knob	269113-1	UHF Channel Sel.-Models TS21EU, KS21EU, TSF21EU
	Knob	269113-2	UHF Channel Sel.-Model KST21EU
	Knob	269125-1	On-off-Volume-Models TSF21E, TSF21EU
	Knob	269125-2	On-off-Volume-Models TS21E, KS21E, TS21EU, KS21EU
	Knob	269125-3	On-off-Volume-Models KST21E, KST21EU
	Dial	269114-1	UHF - Models TS21EU, KS21EU, TSF21EU, KST21EU
	Safety Glass	257609-7	All Models
	Mask	269127-1	Models TS21E, TS21EU
	Mask	269127-2	Models KS21E, TSF21E, KST21E, KS21EU, TSF21EU, KST21EU
	Name Plate	269129-1	All Models

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TROUBLE SHOOTING AIDS (cont)

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V16, V17, V18 and V19. Check M1 fuse. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check T3, T5A, C74, C75, C73, R89, R90, R88 and other associated components.	Check R82, R81, R84, C69, C70, C72, L32 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V17, V18 and V20. Check T3, T5A, R89, C71, C72 and other associated components.

BLOOMING

Check by substitution V17, V18, V19 and V20. Check C70, C71, C72, C75, R90, R89, R85 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6 and V11. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

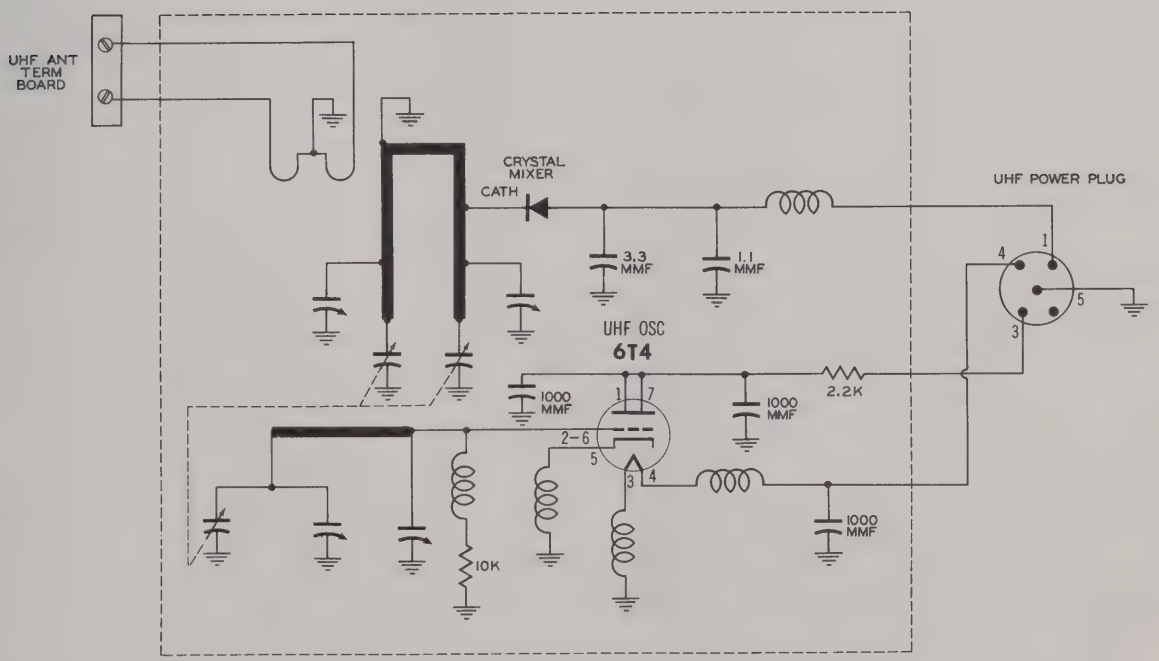
KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



UHF TUNER USED ON MODELS TS21EU, KS21EU, TSF21EU, & LST21EU

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UHF TUNER SCHEMATIC

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

For touch-up adjustment of VHF tuner oscillator adjustments, it is necessary to remove the chassis from the cabinet. (See disassembly instructions). Refer to alignment instructions.

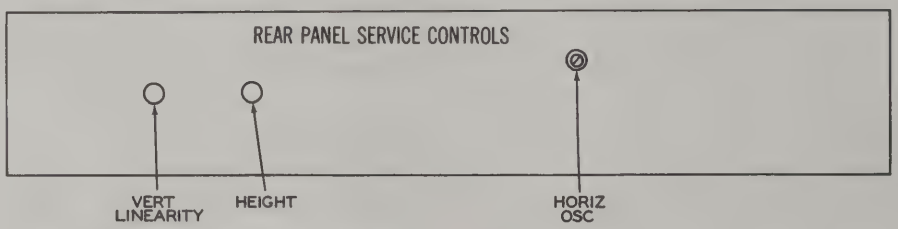
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 2 wood screws holding wood strip at the bottom of the safety glass. Remove wood strip and safety glass. (Use extreme caution when removing safety glass).

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator is located on rear arpon of the chassis.

Set the horizontal hold control at the center of its range and adjust the horizontal oscillator slug (L32) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate "Sound IF detector Buzz" adjust the ratio detector secondary (L31) located on top of chassis. (See tube placement chart).

FUSES

One fuse is used for horizontal sweep circuit protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 8 push-on type control knobs from front panel of cabinet.
2. Remove 7 wood screws and 1 metal screw. Remove rear cover.
3. Remove 2 wood screws holding antenna terminal strip.
4. Disconnect HV lead, picture tube socket, yoke plug and speaker plug. Remove 1 metal screw and disconnect ground strap.
5. Remove 5 chassis bolts. Remove chassis.
6. Remove 2 speaker nuts. Remove speaker.

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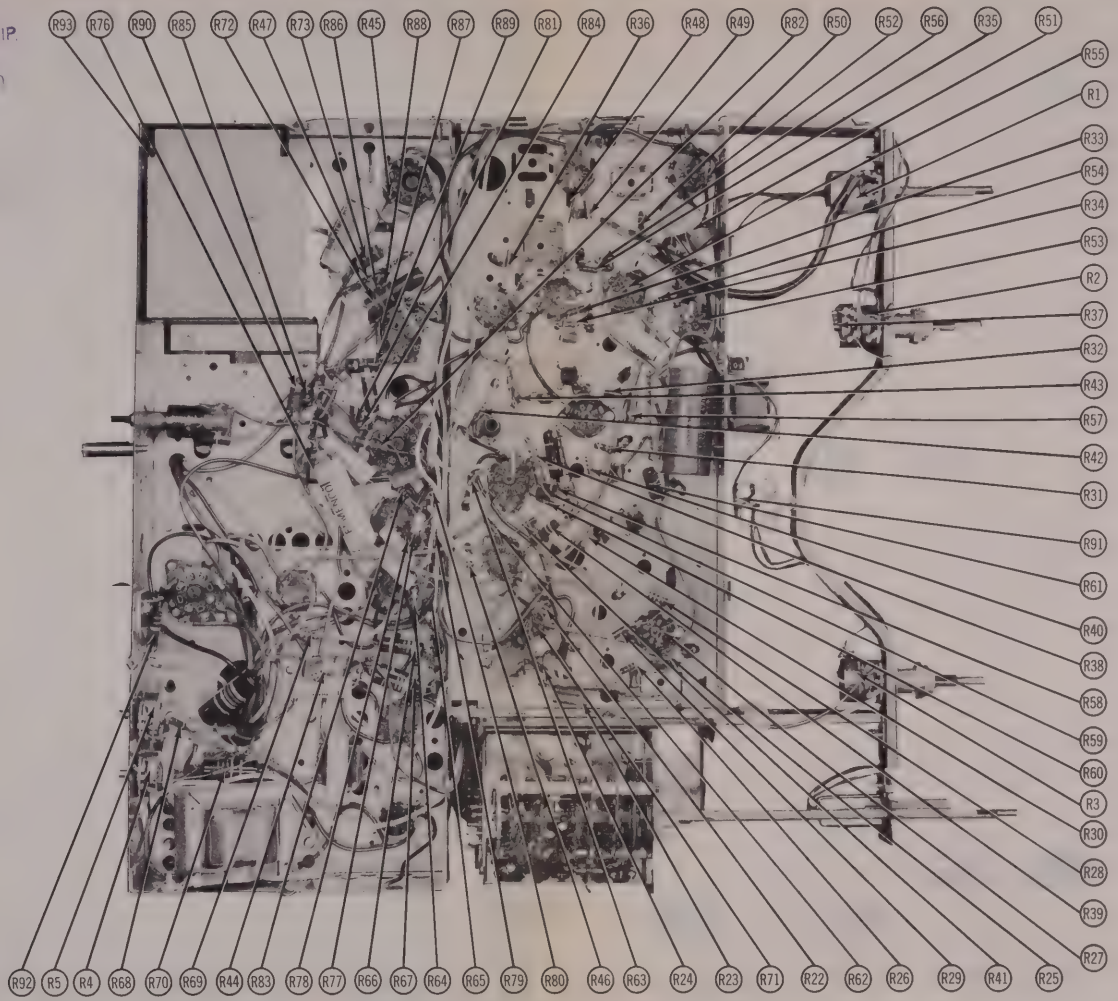

CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

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MODEL 22C07M

CBS-COLUMBIA MODELS 22C05,
22C07, B, M, 22T09, B, EB (Ch. 921-12)

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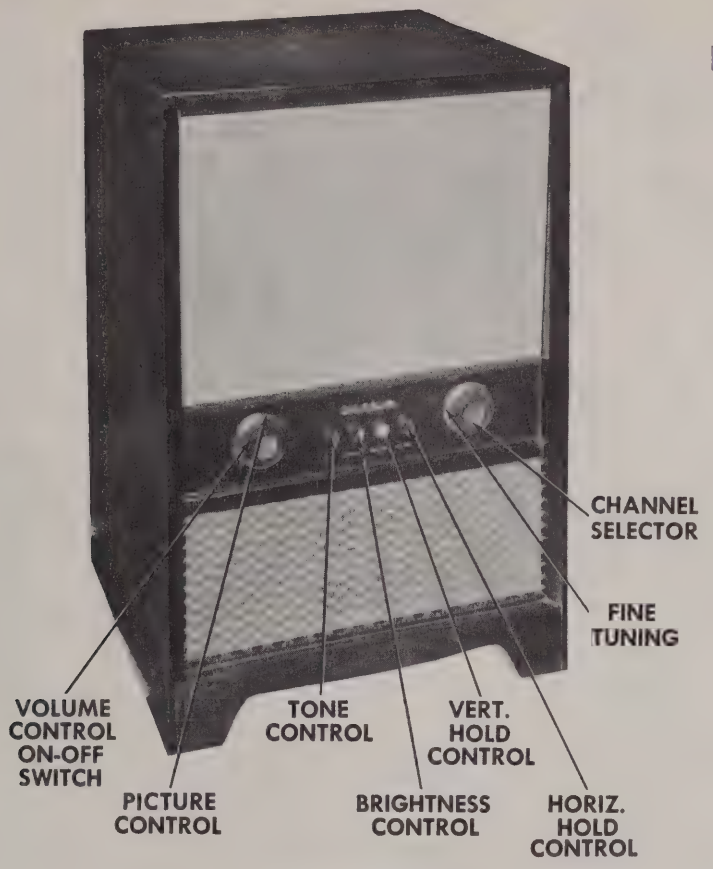

CBS-COLUMBIA MODEL 22C07M

TRADE NAME	CBS-Columbia Models 22C05, 22C07, 22C07B, 22C07M, 22T09, 22T09B, 22T09EB(Ch. 921-12)
MANUFACTURER	CBS-Columbia, A Div. of Columbia Broadcasting System, Inc., 48-50 34th St., Long Island City, N. Y.
TYPE SET	Television Receiver
TUBES	Twenty-one

POWER SUPPLY 110-120 Volts AC-60 Cycles RATING 1.68 Amp. @ 117 Volts AC
TUNING RANGE—Channels 2 thru 13, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

INDEX

Alignment Instructions 6, 7
Disassembly Instructions 18
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions ..... 13 thru 16
Photographs
Cabinet-Rear View 11
Capacitor Identification 4, 9
Chassis-Top View 3
RF Tuner 16
Resistor Identification 19, 20
Photographs (Cont)
Trans., Inductor & Alignment Identification 17
Resistance Measurements 8
Servicing in the Field 18
Schematic (Alternate Tuner) 10
Schematic (TV) 2
Trouble Shooting Aids 12, 17
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

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DATE 7-55 SET 283 FOLDER 2

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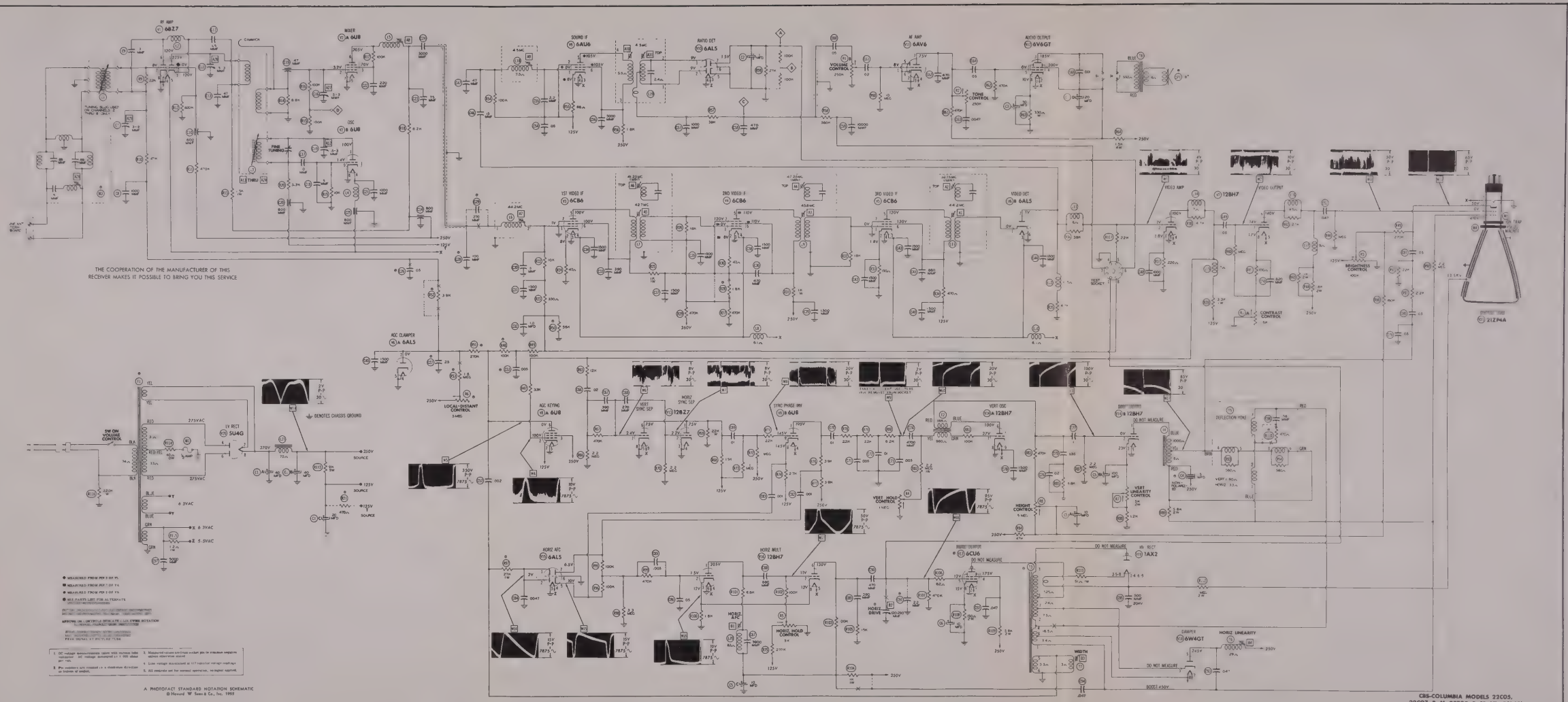
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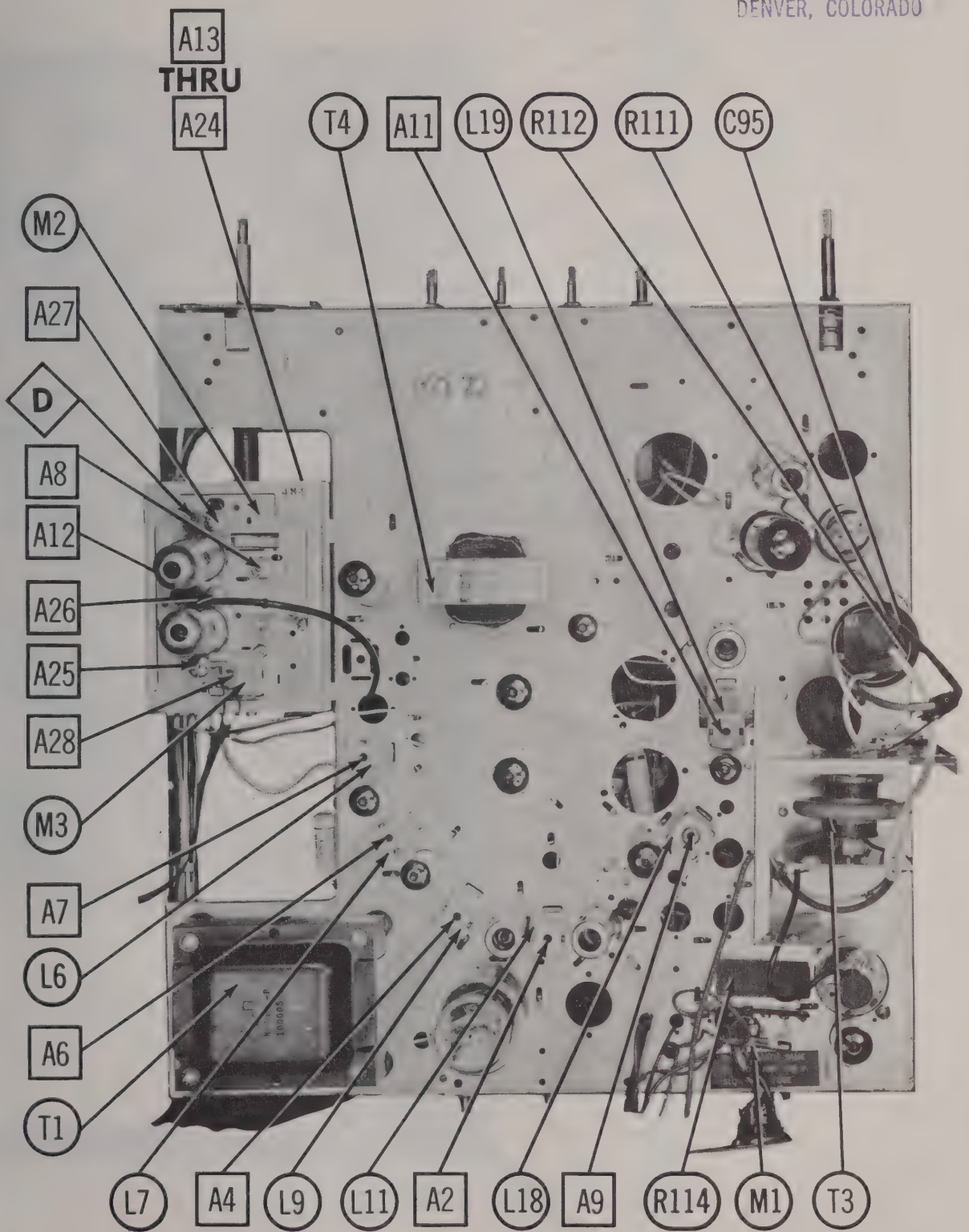

CHASSIS TOP VIEW

SET 283 FOLDER 2

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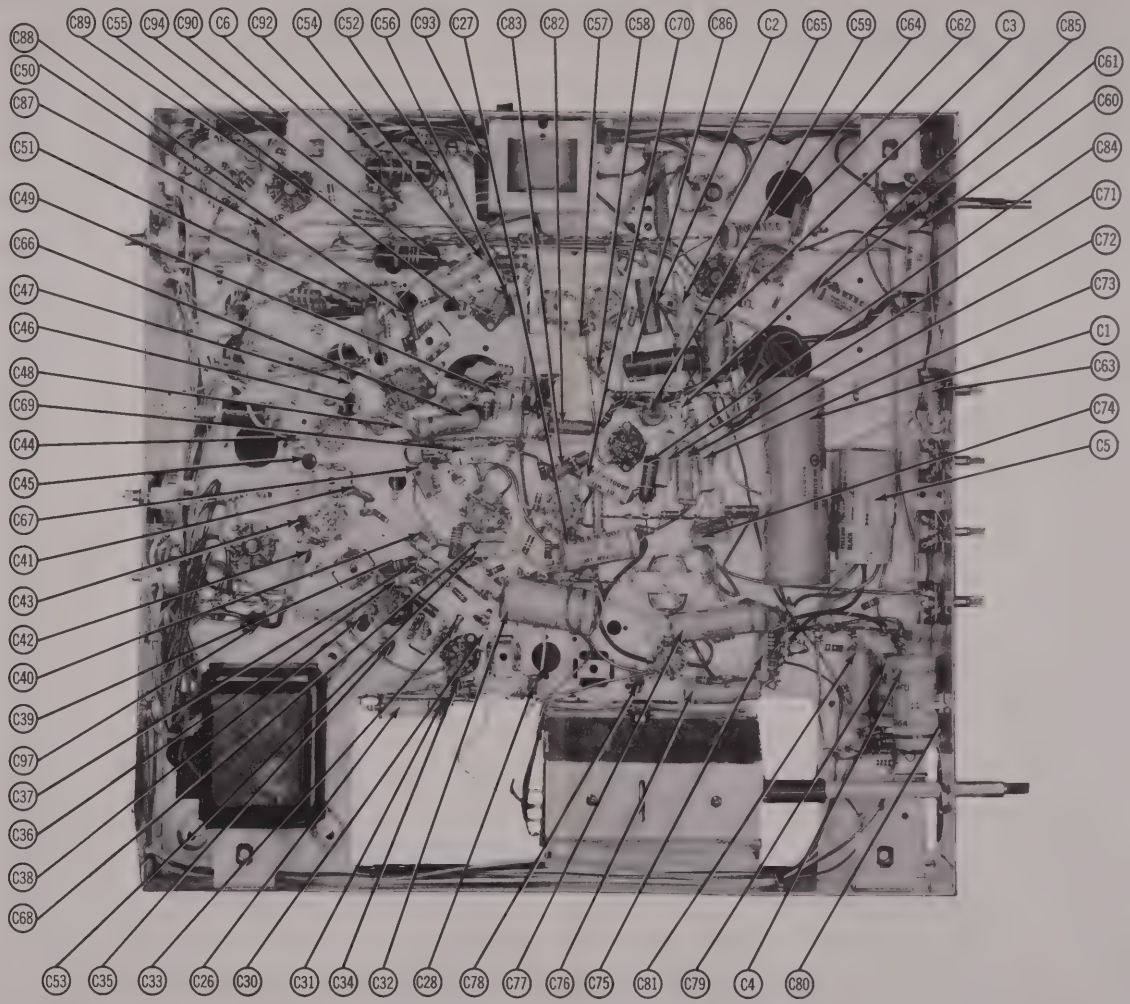

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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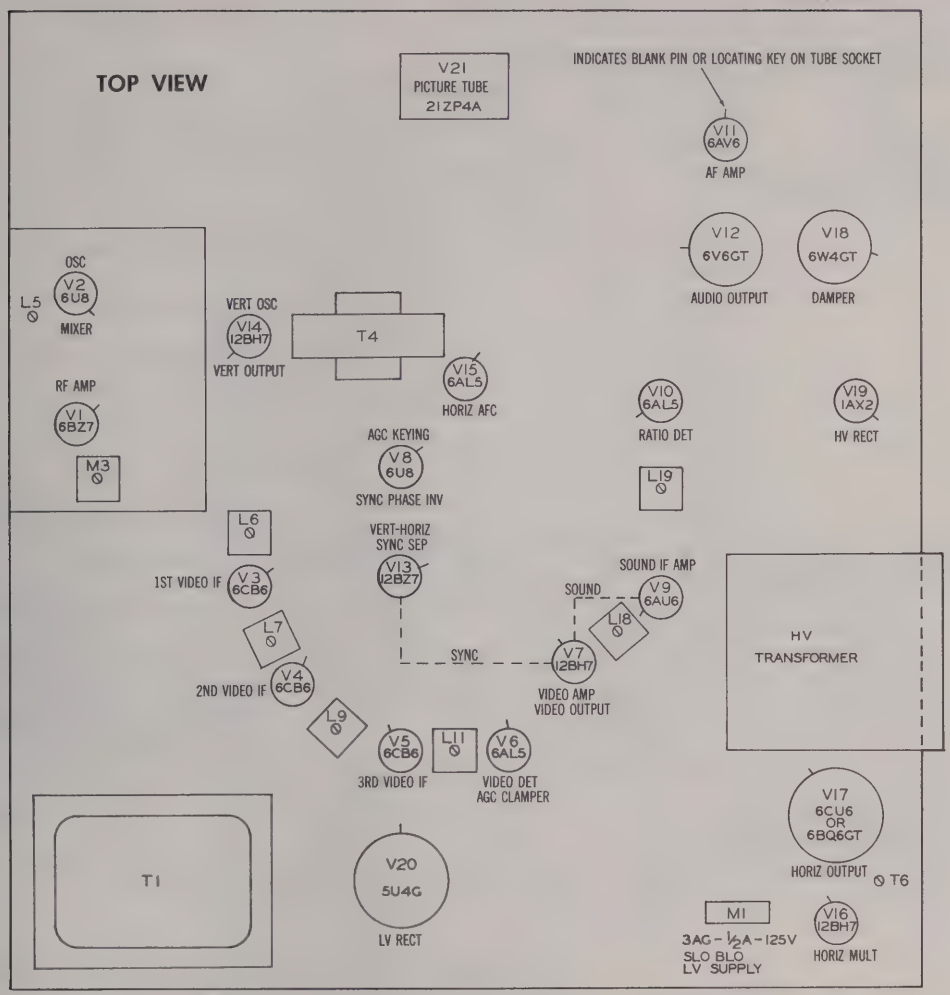
TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V20, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V7, V8, V21
Has pic, no sound - V9, V10, V11, V12
Overloaded picture - V8

SYNC FAILURE
No vert. sync - V8, V14
No horiz. sync - V8, V15, V16
No vert. or horiz. sync - V8, V13

SWEEP FAILURE
No raster, has sound - V16, V17, V18, V19, V21
No vertical deflection - V14
Poor vert. linearity or foldover - V14
Poor horiz. linearity or foldover - V16, V17, V18
Narrow picture - V16, V17, V18, V19, V20
Vert. off freq. - V8, V14
Horiz. off freq. - V8, V15, V16

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard may be eliminated by removing the horizontal multivibrator tube (V16).

VIDEO IF ALIGNMENT

Remove the converter tube (V2) from its socket and replace with a 6U8 with pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Attenuate signal generator output to maintain not more than 3 volts at VTVM.
Connect the negative lead of a 3 volt bias supply to the ungrounded side of C30. Positive lead to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	44.2MC (Unmod)	Any	DC probe to pin 5 of test socket. Common to chassis.	A1	Adjust for maximum deflection.
2.	"	"	39.75MC (Unmod)	"	"	A2	Adjust for MINIMUM deflection.
3.	"	"	45.6MC (Unmod)	"	"	A3	Adjust for maximum deflection.
4.	"	"	47.25MC (Unmod)	"	"	A4	Adjust for MINIMUM deflection,
5.	"	"	42.7MC (Unmod)	"	"	A5	Adjust for maximum deflection.
6.	"	"	41.25MC (Unmod)	"	"	A6	Adjust for MINIMUM deflection.
7.	"	"	44.2MC	"	"	A7	Detune L5. Adjust A7 for maximum deflection.

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Attenuate sweep generator output to maintain 3 volts peak to peak vertical deflection on scope.
Leave bias connected to ungrounded side of C30.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Direct	High side to an ungrounded tube floating over dummy converter tube. Low side to chassis.	44MC (10MC Swp)	39.75MC 41.25MC 42.45MC 45.75MC 47.25MC	Any	Vert. amp. to pin 5 of test socket. Low side to chassis.	A8	Check for response similar to Fig. 1. Adjust A8 to place 45.75MC marker at the 50% point on response curve. Adjust A7 for proper bandwidth. If necessary, SLIGHTLY retouch A2, A4 and A6 for desired response (Fig. 1).

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point Ⓐ to chassis. The junction of these two resistors is alignment point Ⓑ as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	.001MFD	High side to pin 2 (grid) of 12BH7 (V7). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to point Ⓐ. Common to chassis.	A9, A10	Adjust for maximum deflection.
10.	"	"	"	"	DC probe to point Ⓒ. Common to point Ⓑ.	A11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	.001MF D	High side to pin 2 (grid) of 12BH7 (V7). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. thru 22KΩ to point Ⓐ. Low side to chassis.	A9, A10	Disconnect stabilizer capacitor C2. Adjust for curve of maximum amplitude and symmetry as in Fig. 2.
10.	"	"	"	"	"	Vert. Amp. thru 22KΩ to point Ⓒ. Low side to chassis.	A11	Reconnect stabilizer capacitor C2. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 3. SLIGHTLY retouch A10 for maximum amplitude and straightness of crossover lines.

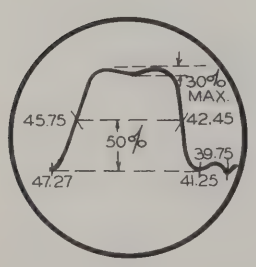


FIG. 1

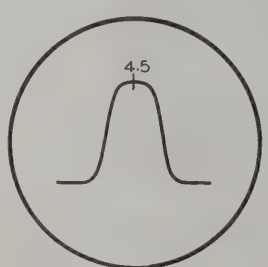


FIG. 2

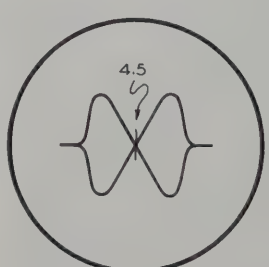


FIG. 3

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ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Remove dummy converter tube and replace original 6U8 in its socket.
Complete oscillator alignment may not be necessary. If the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A12. It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel. If adjustment of A12 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustment screw for each channel that is off frequency. The channel oscillator adjustment screws are reached thru just to the left of the channel switch shaft.
The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. amp. to pin 5 of test socket. Low side to chassis.	A13	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A14	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A15	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A16	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A17	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A18	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A19	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A20	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A21	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A22	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A23	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A24	

RF AND MIXER ALIGNMENT

Connect the negative lead of a 3 volt bias supply to the ungrounded side of C30. Positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across antenna leads with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 22KΩ to point ⓓ. Low side to chassis	A25, A26, A27	Adjust for response curve similar to Fig. 5 with markers above 90%.
13.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		If markers fall below 70% on any channel make compromise adjustment of A25, A26 and A27 with channel switch set to that channel. Then check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

IF WAVE TRAP ADJUSTMENT

The IF wave trap should be tuned to minimize interference caused by signals which fall within the video IF bandpass (40-48MC). Tune in a station on which the interference is noted and adjust A28 for minimum interference in the picture.

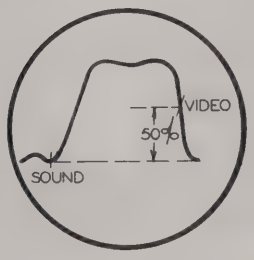


FIG.4

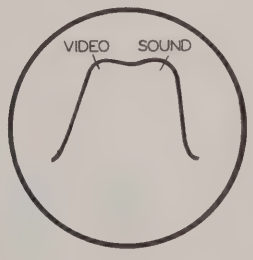
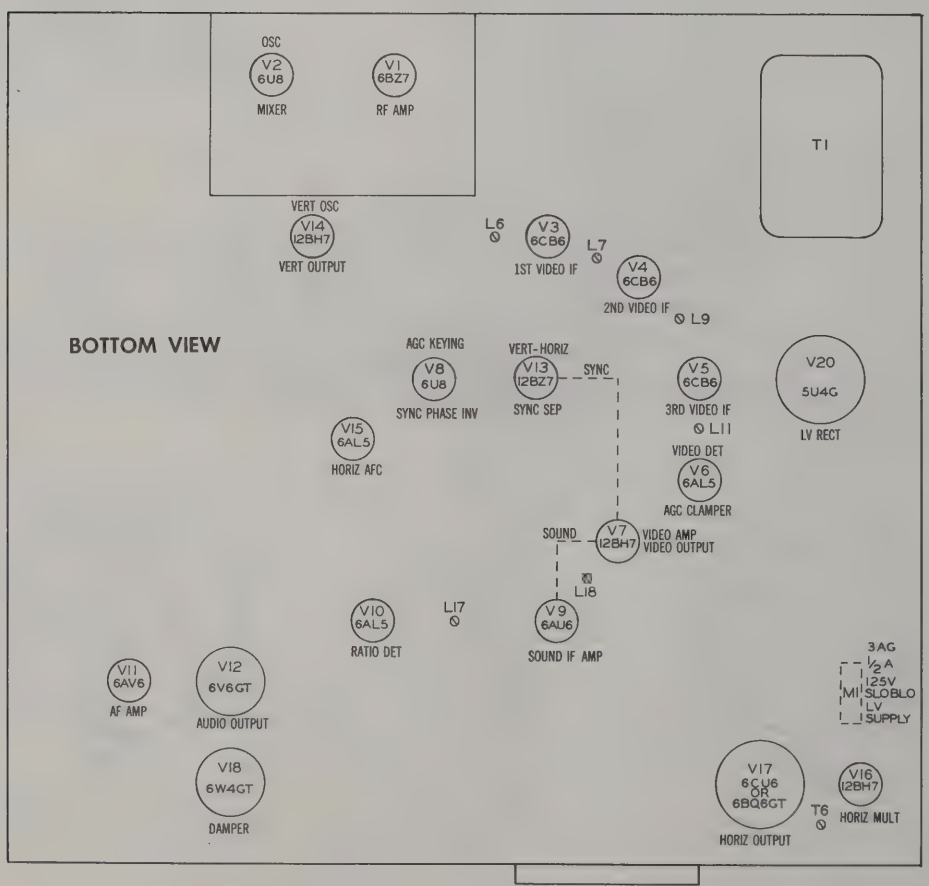


FIG.5

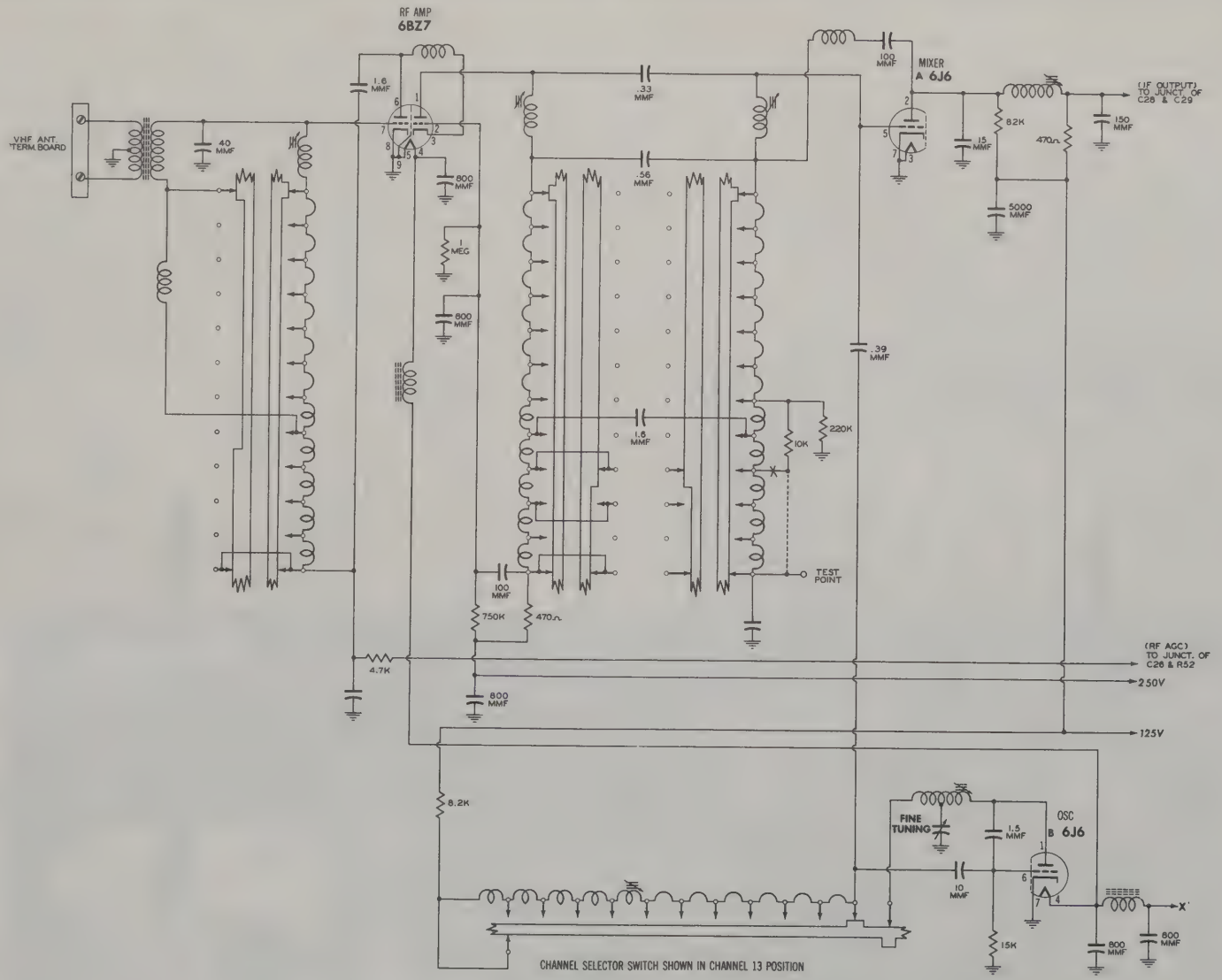
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	†1.5KΩ	†320KΩ	INF	0Ω	.1Ω	INF	500KΩ	0Ω	0Ω
V 2	6U8	■3.3KΩ	200KΩ	†100KΩ	.1Ω	0Ω	†8.2KΩ	0Ω	0Ω	10KΩ
V 3	6CB6	70KΩ	47Ω	0Ω	.1Ω	▲1KΩ	▲1KΩ	0Ω		
V 4	6CB6	240KΩ	240KΩ	0Ω	.1Ω	†1KΩ	†1KΩ	240KΩ		
V 5	6CB6	.1Ω	150Ω	.1Ω	0Ω	†9.5KΩ	†9.5KΩ	0Ω		
V 6	6AL5	.3Ω	500KΩ	.1Ω	0Ω	0Ω	0Ω	4.7KΩ		
V 7	12BH7	†12.3KΩ	4.7KΩ	220Ω	.1Ω	.1Ω	†7KΩ	1Meg	1.2KΩ	0Ω
V 8	6U8	†8KΩ	†45KΩ	†70Ω	.1Ω	0Ω	250KΩ	†9KΩ	2.7KΩ	†500KΩ
V 9	6AU6	100KΩ	20KΩ	.1Ω	0Ω	†1.8KΩ	†1.8KΩ	20KΩ		
V 10	6AL5	INF	INF	.1Ω	0Ω	0Ω	0Ω	27KΩ		
V 11	6AV6	10Meg	0Ω	0Ω	.1Ω	0Ω	0Ω	†470KΩ		
V 12	6V6GT	NC	.1Ω	†2KΩ	†1.5KΩ	470KΩ	NC	0Ω	330Ω	
V 13	12BZ7	■8KΩ	2.2Meg	0Ω	0Ω	0Ω	■8KΩ	2.7Meg	0Ω	.1Ω
V 14	12BH7	◓6.5KΩ	2.2Meg	2KΩ	0Ω	0Ω	†1Meg	3Meg	0Ω	.1Ω
V 15	6AL5	27KΩ	27KΩ	0Ω	.1Ω	3.4Meg	0Ω	3.4Meg		
V 16	12BH7	†8KΩ	3.8Meg	1.8KΩ	.1Ω	.1Ω	†100KΩ	100KΩ	1.8KΩ	0Ω
V 17	6CU6	TP	0Ω	TP	†5.6KΩ	470KΩ	TP	.1Ω	150Ω	TOP CAP ◓24Ω
V 18	6W4GT	NC	NC	5Meg	NC	†100Ω	NC	5Meg	5Meg	
V 19	1AX2		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ◓550Ω
V 20	5U4G	NC	25KΩ	NC	31Ω	NC	33Ω	NC	25KΩ	
V 21	21ZP4A	0Ω	1Meg	PIN 10 2.2Meg	PIN 11 ■300KΩ	PIN 12 .1Ω				

† MEASURED FROM PIN 8 OF V20.
■ MEASURED FROM 125V LINE
▲ MEASURED FROM PIN 7 OF V4
◓ MEASURED FROM PIN 3 OF V18
TP - TIE POINT
NC - NO CONNECTION



TUBE PLACEMENT CHART



VHF TUNER PART NO. 6900015i USED ON SOME VERSIONS

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ALTERNATE TUNER SCHEMATIC

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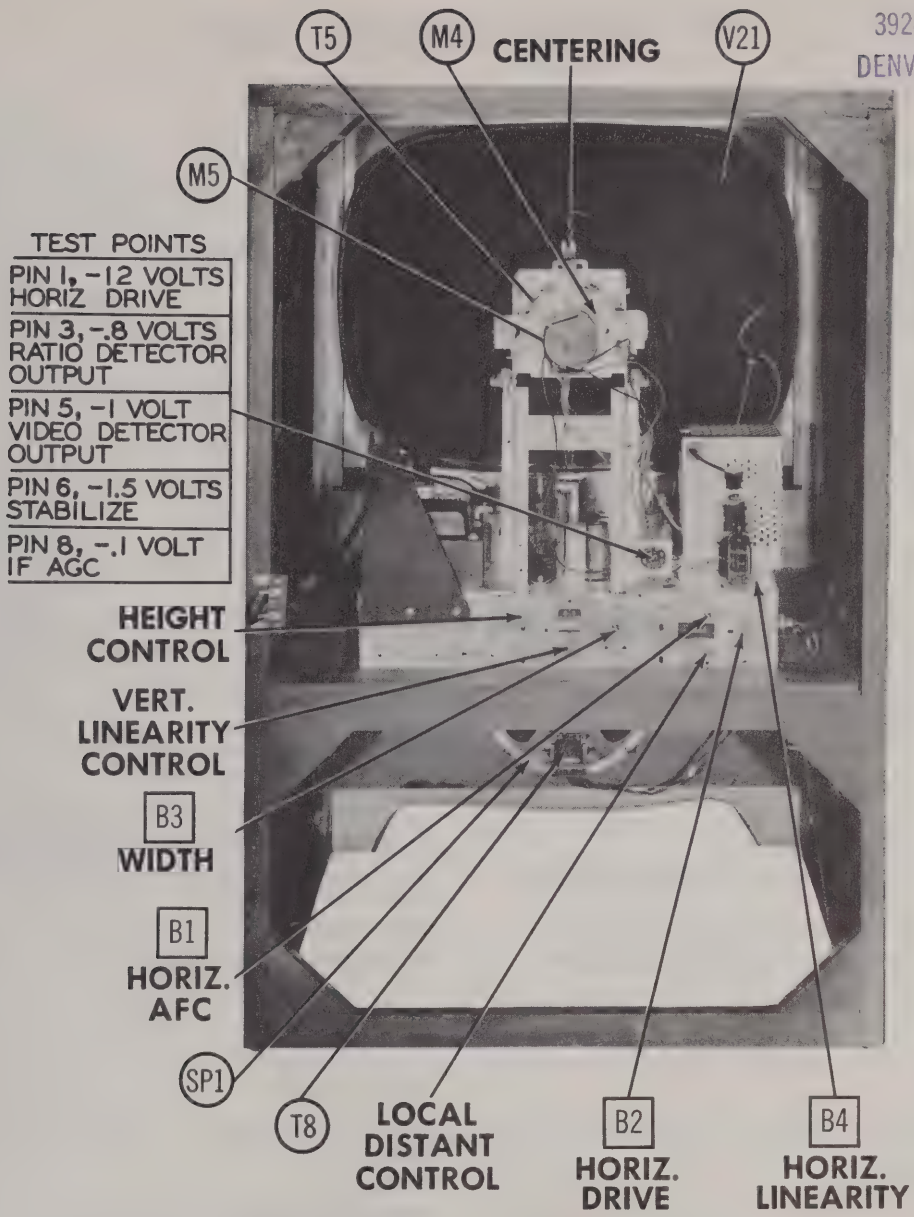

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Set the horizontal hold control to the center of its range and adjust the horizontal AFC slug (B1) until the picture synchronizes horizontally.

Adjust the horizontal drive trimmer (B2) in a clockwise direction as far as possible without the presence of vertical white lines or compression of the center of the picture.

Adjust the width slug (B3) for a picture slightly wider than necessary to fill the mask horizontally.

Adjust the horizontal linearity slug (B4) for a picture that is symmetrical from left to right.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V17, V18 and V20. Check adjustments B2, B3 and B4. Check T3, T5A, C90, C88, R108, R109 and other associated components.

DRIVE LINES

Check by substitution V17 and V18. Check adjustments B2 and B4. Check C90, C6, R108, R109 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V17 and V18. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V16, V17 and V18. Check C86 for open. Check L20, C87, C85 and other associated components.

XMAS TREE EFFECT

Check by substitution V16, V17 and V18. Check T3 and T5 for internal arcing. Check C84, C88, C90, L20, R97, R101 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V14. Check waveform W11.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R89, R88, C4, C79 and other associated components.	Check T2, R82, R84, R83, R8 and other associated components.

INSUFFICIENT SWEEP

Substitute V14. Check height and vertical linearity controls for proper operation. Check R83, R84, T4 and other associated components.

COMPRESSED AT BOTTOM

Substitute V14. Check R84, R83, R8, T2, C77 and other associated components.

COMPRESSED AT TOP

Substitute V14. Check R88, R7, C5B, T4, T5B and other associated components.

FOLDS

Substitute V14. Check C75, C76, C77, R85, T2, T4 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V8 and V13. Check C66, C67, C68, C69, R76, R77, R68 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V14. Check vertical integrator network. Check R4, R82, C74, T2 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V15 and V16. Check C82, C83, C85, C87, R5, R102, L20 and other associated components.

HORIZONTAL BENDING

Check by substitution V8, V13, V15 and V16. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V7. Check C49, C51, R43, R44, R39, L17, L15 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check video IF alignment.

POOR CONTRAST

Substitute V7. Check contrast control. Check L13, L14, L16, R37, R39, R42, C48, C49, C51 and other associated components.

NEGATIVE PICTURE

Substitute V7. Check picture tube. Check C49, C51, R42, L16, L14 and other associated components.

SMEAR

Substitute V7. Check video detector network. Check L12, L13, L14, L15, L16, C49, C51 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V9, V10, V11 and V12. Check stages V11 and V12 using audio signal generator. Apply audio signal across R18.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C60, C61, C62, C64, C65, R61, R63, R64, T8, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A11 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, substitute V20. Check B+ filter and decoupling network. Check M1 fuse.

SMALL AND/OR DIM PICTURE

Substitute V20. Check B+ filter and decoupling network.

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3924 [illegible]
DENVER, [illegible]

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		CBS-Columbia PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6BZ7	6BZ7	9AJ	
V2	Mixer-Osc.	6U8	6U8	9AE	
V3	1st Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Det.-AGC Clamper	6AL5	6AL5	6BT	
V7	Video Amp. - Video Output	12BH7	12BH7	9A	
V8	AGC Keying-Sync Phase Inv.	6U8	6U8	9AE	
V9	Sound IF Amp.	6AU6	6AU6	7BK	
V10	Ratio Det.	6AL5	6AL5	6BT	
V11	AF Amp.	6AV6	6AV6	7BT	
V12	Audio Output	6V6GT	6V6GT	7S	
V13	Vert. Sync Sep. - Horiz. Sync Sep.	12BZ7	12BZ7	9A	
V14	Vert. Osc. - Vert. Output	12BH7	12BH7	9A	
V15	Horiz. AFC	6AL5	6AL5	6BT	
V16	Horiz. Mult.	12BH7	12BH7	9A	
V17	Horiz. Output	6CU6	6CU6	6AM	6BQ6GT used as alternate.
V18	Damper	6W4GT	6W4GT	4CG	
V19	HV Rectifier	1AX2	1AX2	9Y	
V20	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	CBS-Columbia PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V21	21ZP4A	21ZP4A 21ZP4B ①	21ZP4A 21ZP4B ①	21ZP4A 21ZP4B ① 21ZP4 ②	21ZP4A 21ZP4B ①	12N 12N	① Aluminized ② Circuit changes necessary

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	CBS-Columbia PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	40	350	21000861			TCQ447	TDL-D40-450	T632	
B	40	350					TDL-D20-450	MT-3516	
C	20	350							
D	20	350							
C2	1	100	21000521				TD-4-150	MMT-4501	
C3	50	25	21000531			TC29	TD-50-25	FM-0250	
C4	5	350	21000481				TD-5-350NP	MT-3512 MT-3512 *	Note 1
C5A	10	350	21000851			TCT3663	TM-3061	T-810	
B	100	50							
C	10	350							
C6	10	25	21000251			TC22	TD-10-25	FM-0210	
C7	3-9			829-10					
C8	1000			DD-102	801-001	DC-521			
C9	3			TCZ-3	NP0A-030	ZT-5533			
C10	800								
C11	.5-3			829-3	3115-01-0R5	CT565A			
C12	1.5			TCZ-1.5	NP0A-1R5	ZT-5515			
C13	47			D6-470	831-470	UC-5447			
C14	800								
C15	47								
C16	.5-3			829-3	3115-01-0R5	CT565A			
C17	10								
C18	5								
C19	.5-3			829-3	3115-01-0R5	CT565A			
C20	800								
C21	1000			DD-102	801-001	DC-521			
C22	220			D6-221	811-221	UC-5322			
C23	75								
C24	5000			DD-502	811-005	DC-525			
C25	800								
C26	.05	200	22011240	DF-503		PT415	IMP2-S5	330215	Note 2
C27	.25	200				PT4025	IMP2-P25	3302025	Note 3
C28	100			D6-101	GP1K-101	UC-531		K-1310	Note 4
C29	270		20003940	D6-271	GP2K-271	UC-5327		K-1327	Note 2
C30	5		23001990	D6-050	GP1K-050	ZT-555		K-1550	
C31	1500		23064640	DD-152	801-0015	DC-5215		C-1215	
C32	1.0	100	22010850			PT41	CT2-1	330210	
C33	390		23002190	D6-391	GP2K-391	UC-5339		K-1339	
C34	1500		23064640	DD-152	801-0015	DC-5215		C-1215	
C35	1500		23064640	DD-152	801-0015	DC-5215		C-1215	
C36	470		23002200	D6-471	GP2K-471	UC-5347		K-1347	
C37	1500		23064640	DD-152	801-0015	DC-5215		C-1215	
C38	1500		23064640	DD-152	801-0015	DC-5215		C-1215	
C39	1500		23064640	DD-152	801-0015	DC-5215		C-1215	
C40	1500		23064640	DD-152	801-0015	DC-5215		C-1215	
C41	680		23002220	D6-681	GP2K-681	UC-5368		K-1368	
C42	1500		23064640	DD-152	801-0015	DC-5215		C-1215	
C43	1500		23064640	DD-152	801-0015	DC-5215		C-1215	
C44	1500		23064640	DD-152	801-0015	DC-5215		C-1215	
C45	1500		23064640	DD-152	801-0015	DC-5215		C-1215	
C46	15		23000520	D6-150	GP1K-150	UC-5415		K-1415	
C47	47		23000131	TCZ-47	NP0K-470	ZT-5447		KR-1447	
C48	1000		23002740	D6-102	GP2L-102	UC-521		K-1210	
C49	.05	400	22011740	DF-503		PT425	IMP4-S5	330415	
C50	820		23002230	D6-821	GP2K-821			K-1382	
C51	.047	600	22017740	DF-503		PT6147	IMP6-S47	3306147	
C52	.002	600	22012180	D6-202	GP2-333-202	PT622	IMP6-D5	330622	
C53	.005	600	22012120	D6-502	GP2-333-502	PT625	IMP6-D5	330625	Notes 3, 5
C54	.05	400	22011740	DF-503		PT415	IMP4-S5	330415	
C55	2.2		23041160	TCZ-2.2	NP0A-2R2				
C56	5000		23064680	DD-502	811-005	DC-525		C-1250	

L. F. C.
39?1 MEA...
DENVER, COLORADO

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	REPLACEMENT DATA CBS-Columbia Part No.	CENTRALAB Part No.	ERIE Part No.	MALLORY Part No.	PYRAMID Part No.	SANGAMO Part No.	NOTES
C57	1000		23003240	DS-108	GP2L-103	UC-531		K-1210	
C58	470		23003200	DS-471	GP2K-471	UC-5347		K-1347	
C59	10000		23060030	DD-103	GU-01	DC-511			
C60	.05	600	23012340	DF-503		PT615	IMPE-85	330615	
C61	.02	600	23012300	DF-203	S17-02	PT613	IMPE-83	330612	
C62	470	500	20004000	DS-471	GP3K-471			K-1347	
C63	.0047	600	23012180	DS-472	GP3-333-472	PT6347	IMPE-D47	3306347	
C64	.05	600	23012340	DF-503		PT615	IMPE-85	330615	
C65	.001	600	23012040	DS-102	GP3L-103	PT631	IMPE-D1	330621	
C66	.02	600	23012700	DF-203	S17-02	PT613	IMPE-83	330612	
C67	390	500	20003980			MCB343		KR-1339	
C68	270	500	20002940	TC2-270	NPO-335-271			KR-1327	
C69	.01	600	23012180	DS-103	GP3-333-103	PT611	IMPE-81	330611	
C70	.01	600	23012180	DS-103	GP3-333-103	PT611	IMPE-81	330611	
C71	.005	600	23012120	DS-502	GP3-333-502	PT6505	IMPE-D5	3306315	
C72	.01	600	23012180	DS-103	GP3-333-103	PT611	IMPE-81	3306 1	
C73	.005	600	23012120	DS-502	GP3-333-502	PT6505	IMPE-D5	330625	
C74	4700	500	20011940			MCB5465		CR-1347	
C75	.035	600	23000021						
C76	.02	600	23012300	DF-203	S17-02	PT613	IMPE-83	330612	
C77	.1	600	23012360	DF-104		PT601	IMPE-P1	330601	
C78	1500		23064640	DD-152	801-0015	DC-5315		C-1215	
C79	.05	600	23012340	DF-503		PT615	IMPE-85	330615	
C80	.05	600	23012340	DF-503		PT615	IMPE-85	330615	
C81	.05	600	23012340	DF-503		PT615	IMPE-85	330615	
C82	.001	600	23017540	DS-102	GP2L-103	PT631	IMPE-D1	330621	
C83	.001	900	23017640	DS-102	GP2L-103	PT631	IMPE-D1	330621	
C84	.0047	600	23017620	DS-472	GP2-333-472	PT6347	IMPE-D47	3306347	
C85	.005	600	23017620	DS-502	GP2-333-502	PT6315	IMPE-D5	330625	
C86	.05	600	23017740	DF-503		PT615	IMPE-85	330615	
C87	3900	500	20011280			MCB463		CR-1359	
C88	680	500	20004080					KR-1368	
C89	390	500	20003980			MCB343		KR-1339	
C90	470	500	20004000			MCB345		KR-1347	Note 6
C91	33		20003680						
C92	.047	600	23017540	DF-503		PT6147	IMPE-847	3306147	
C93	.047	600	23017740	DF-503		PT6147	IMPE-847	3306147	
C94	.047	600	23017740	DF-503		PT6147	IMPE-847	3306147	
C95	500	30000	23000161	TY3-502	413	TY3035A			
C96	56			DD30-560		DC30456			
C97	5000		23064680	DD-502	811-005	DC-525		C-1250	

Note 1. Non-polarized unit.
Note 2. Not used in some versions.
Note 3. Some versions use .047MFD in this application (part #23011240).
Note 4. Some versions use 120MMF in this application (part #23004630).
Note 5. Some versions use .01MFD in this application.
Note 6. When horizontal drive trimmer is used, C81 is not used.
* Connect negative leads together.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA CBS-Columbia Part No.	IRC Part No.	CLAROSTAT Part No.	CENTRALAB Part No.	MALLORY Part No.	INSTALLATION NOTES
R1A	500KΩ	½	3800046R	*QJ-537	RTV-393	F1-31	UF53R	Contrast - Panel
B	250KΩ	½				R2-35	UR54A	† Volume - Rear
C	Switch					K2-1	UR-36	Attach to R1B
R2A	25KΩ	½	3800051	Q11-130	A47-250K-S	AB-50	U-46	Tone
B	Shaft		Not Req.	Not Req.	K56-3	AK-4	Not Req.	Attach to R2A
R3A	100KΩ	½	3800053	Q11-138	A47-100K-S	AB-60	U-41	Brightness
B	Shaft		Not Req.	Not Req.	K56-3	AK-4	Not Req.	Attach to R3A
R4A	1Meg	½	3800051	Q11-137	A47-1Meg-S	AB-58	U-57	Vert. Hold
B	Shaft		Not Req.	Not Req.	K56-3	AK-4	Not Req.	Attach to R4A
R5A	5000Ω	½	3800054	Q11-144	A47-5000-S	AB-10	U-44	Horiz. Hold
B	Shaft		Not Req.	Not Req.	K56-3	AK-4	Not Req.	Attach to R5A
R6A	5Meg	½	3800043	Q11-141	A47-5Meg-S	AB-57	SU-67	Local-Distant - Note
B	Shaft		Not Req.	Not Req.	FK8-1/4	AK-1	Not Req.	Attach to R6A
R7A	5000Ω	2	3800361	Q11-135	WK-5000	AA1-5000	RB500L	Vert. Linearity - Wire-Wound
B	Shaft		Not Req.	Not Req.	K56-3	Not Req.	Not Req.	Attach to R7A
R8A	1Meg	½	3800043	Q11-141	A47-5Meg-S	AB-57	SU-67	Height
B	Shaft		Not Req.	Not Req.	FK8-1/4	AK-1	Not Req.	Attach to R8A

Note: Not used in some versions.
* CONCENTRIKIT EQUIVALENT: KIT K-4, BASE ELEMENTS & SHAFTS: B17-1A & P1-1A (PANEL)
B13-130 & R14-204 (REAR)
78-1 SWITCH
† Universal replacement (Mallory exact duplicate part no. UE570S)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA CBS-Columbia Part No.	IRC Part No.	NOTES
R9	22KΩ	½		BTS-22K	
R10	47KΩ	½		BTS-47K	
R11	470KΩ	½		BTS-470K	
R12	820KΩ	½		BTS-820K	
R13	1500Ω	1		BTA-1500	
R14	6800Ω	½		BTS-6800	
R15	100KΩ	½		BTS-100K	
R16	100KΩ	½		BTS-100K	
R17	100KΩ	½		BTS-100K	
R18	82000 5%	½		BTS-8200 5%	
R19	10KΩ	½		BTS-10K	
R20	330Ω	½		BTS-330Ω	
R21	470Ω	½	30471230	BTS-470	Note 1
R22	10KΩ	½	30023230	BTS-10K	
R23	330Ω	½	30331230	BTS-330	
R24	47Ω	½	30470330	BTS-47	
R25	100Ω	½	30023240	BTA-1000	
R26	18KΩ	½	30183230	BTS-18K	
R27	470KΩ	½	30474230	BTS-470K	Note 1
R28	180Ω	½	30183330	BTS-1800	
R29	470KΩ	½	30474330	BTS-470K	
R30	47Ω	½	30470230	BTS-47	
R31	1000Ω	½	30012240	BTA-1000	
R32	18KΩ	½	30183220	BTS-18K	
R33	150Ω	½	30151230	BTS-150	
R34	470Ω	½	30471230	BTS-470	
R35	4700Ω	½	30472230	BTS-4700	
R36	39KΩ	½	30393230	BTS-39K	
R37	220Ω	½	30221230	BTS-220	
R38	4700Ω	½	30472230	BTS-4700	
R39	3300Ω	1	30332240	BTA-3300	
R40	1Meg	½	30105230	BTS-1Meg	
R41	100Ω	1	30012240	BTA-100	
R42	27KΩ	½	30273230	BTS-27K	
R43	11KΩ 5%	2	30113150	BTS-11K 5%	
R44	18KΩ	2	30183250	BTS-18K	
R45	270KΩ	½	30274250	BTS-270K	
R46	1Meg	½	30105230	BTS-1Meg	
R47	33KΩ	½	30333230	BTS-33K	
R48	100KΩ	½	30104230	BTS-100K	Note 2
R49	100KΩ	½	30104230	BTS-100K	Note 2
R50	56KΩ	½	30563230	BTS-56K	Note 3

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA CBS-Columbia Part No.	IRC Part No.	NOTES
R51	270KΩ	½	30274330	BTS-270K	Note 5
R52	390Ω	½	30393330	BTS-390Ω	Note 1
R53	1.5Meg	½	30185330	BTS-1.5Meg	Note 4
R54	100KΩ	½	30104330	BTS-100K	
R55	68Ω	½	30680330	BTS-68	
R56	1800Ω	½	30182330	BTS-1800	
R57	39KΩ	½	30393330	BTS-39K	
R58	560KΩ	½	30564330	BTS-560K	
R59	270KΩ	½	30273330	BTS-270K	
R60	10Meg	½	30106330	BTS-10Meg	
R61	470KΩ	½	30474330	BTS-470K	
R62	470KΩ	2	30474330	BTS-470K	
R63	330Ω	1	30331240	BTA-330	
R64	1500Ω	4	31500021	PW4-1500	
R65	12KΩ	½	30123330	BTS-12K	
R66	2.2Meg	½	30225230	BTS-2.2Meg	
R67	470KΩ	½	30474330	BTS-470K	
R68	15KΩ	½	30153230	BTS-15K	
R69	33KΩ	½	30333340	BTA-33K	
R70	2.2Meg	½	30225330	BTS-2.2Meg	
R71	33KΩ	½	30333330	BTS-33K	
R72	1Meg	½	30105330	BTS-1Meg	
R73	1Meg	½	30105330	BTS-1Meg	
R74	27000	½	30273330	BTS-27000	
R75	270KΩ	½	30274330	BTS-270K	
R76	3900Ω	½	30392330	BTS-3900	
R77	3900Ω	½	30392330	BTS-3900	
R78	33KΩ	½	30333230	BTS-33K	
R79	22KΩ	½	30223230	BTS-22K	
R80	8200Ω	½	30822230	BTS-8200	
R81	100KΩ	½	30104330	BTS-100K	
R82	2.2Meg 5%	½	30225560	BTS-2.2Meg 5%	
R83	470KΩ	½	30474330	BTS-470K	
R84	47KΩ	½	30473330	BTS-47K	
R85	68000Ω	½	30683330	BTS-6800	
R86	180KΩ	½	30184330	BTS-180K	
R87	2.2Meg	½	30225330	BTS-2.2Meg	
R88	12000Ω	½	30123330	BTS-1200	
R89	5600Ω	½	30562250	BTS-5600	
R90	2.2Meg	½	30225330	BTS-2.2Meg	
R91	2200Ω	½	30222330	BTS-2200	
R92	22KΩ	½	30223330	BTS-22K	
R93	56Ω	½		BTS-560	
R94	560Ω	½		BTS-560	
R95	100KΩ	½	30104330	BTS-100K	
R96	100KΩ	½	30104330	BTS-100K	
R97	27KΩ	1	30273240	BTA-27K	Note 5
R98	3.3Meg	½	30335330	BTS-3.3Meg	
R99	470KΩ	2	30474230	BTS-470K	
R100	18000 5%	½	30183230	BTS-1800 5%	
R101	6800Ω	½	30682230	BTS-6800	
R102	100KΩ	2	30104230	BTS-100K	
R103	100KΩ	2	30104230	BTS-100K	
R104	1000Ω	1	30102240	BTA-1000	
R105	15KΩ	½	30153230	BTS-15K	
R106	82Ω	½	30820230	BTS-82	
R107	470KΩ	2	30474230	BTS-470K	
R108	150Ω	2	30151250		
R109	5600Ω	2	30562250	BTS-5600	
R110	470Ω	½		BTS-470	Note 1
R111	.5Ω	1	30000041		
R112	1Meg	2	30105350	BTS-1Meg	
R113	900Ω	5	31000095		
R114	40Ω	10	31000096		
R115	1.5Ω	1	30000081		
R116	220KΩ	1	30225240	BTA-220K	
R117	22KΩ	1	30223230	BTS-22K	

Note 1. Not used in some versions.
Note 2: Some versions use a 47KΩ resistor in this application.
Note 3: Some versions use a 100KΩ resistor in this application.
Note 4: Some versions use a 10Meg resistor in this application.
Note 5: Some versions use a 22KΩ 1 watt resistor in this application.
Note 6: Some versions use a 91KΩ resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA CBS-Columbia Part No.	Halldorson Part No.	Merit Part No.	RCA TYPE No.	Stancor Part No.	Thordorson Part No.	Triad Part No.
T1	117VAC ①1.65A	875VCT .330ADC	5VAC ②3A	10000971 10000411 ①		P-8336	P-3055			
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC ①1.2A	6.3VAC ②3.1A								

① Alternate power transformer.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA CBS-Columbia Part No.	Halldorson Part No.	Merit Part No.	RCA TYPE No.	Ram Part No.	Stancor Part No.	Thordorson Part No.	Triad Part No.
T2	Vert. Osc. Trans.	10000063	B8702	A-3003	209T1 ⑦	V40S	A-8125	24A87①	A-97X
T3	Horiz. Output Trans.	12000751 1200015I ③	B7441 & RF800*④	HVO-3 & MWC-1 ⑤	223T1 *	X09S *⑥	A-8155 * ⑨	FLY-38 *	D-35 *
T4	Vert. Output Trans.	10000221	21804 ①	A-3031 ①	222T1 ⑦	V31S ⑦	A-8123 ①	26852 ①	A-102X ①
T5A	Yoke-Horiz.(53MH) Vert.(42MH)	16000643 ⑪	DF805 ②	MDF-73 ②	232D1 ⑦	Y70P20/43 ⑦	DY-1A ①	Y-30 ①	Y-12-J ①
B	Rear						②		
T6	Horiz. Lin. Coil Q.6-17.5MH	16000201	RF800⑤ ⑥	MWC-1⑤⑫	215R1	201R16	WC-5 ⑦⑧	WC-18 ⑧	WC-12 ⑦
T7	Width Coil (1.3-3.4MH	1600111		MWC-1⑤ ⑫	209R1 ⑦	201R13A	WC-6 ⑫	WC-17 ⑧ ⑫	WC-13 ⑧

① Drill new mounting hole(s).
② Connect horizontal damping network across terminal #2 and #7, use original network, if necessary.
③ See instructions packed with unit pertaining to horizontal damping network.
④ Remove damping capacitor from terminals #1 and #3, use original horizontal damping network, if necessary.
⑤ Connect to terminals #1 and #2.
⑥ Enlarge mounting hole.
⑦ Connect to coded red and blue terminals.
⑧ Connect to coded blue and green terminals.
⑨ Alternate horizontal output transformers.
⑩ Use original mounting bracket.
⑪ Includes capacitor C86, resistors R93, R94, and R110.
⑫ Do not use tap.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordorson Replacement Connections	Triad Replacement Connections
	3	Hi-volt Rect. Plate Lead	Hi-volt Rect. Plate Lead	Hi-volt Rect. Plate Lead	10	Hi-volt Rect. Plate Lead	Hi-volt Rect. Plate Lead	Hi-volt Rect. Plate Lead
	9	9	9	10	1	5	3	10
	7	8 or 7	8 or 7	8	3	4	Jumper 2 & 10	8
	2 & 4 (NC)	NC	NC	NC	NC	NC	NC	NC
	8	4	4	5	7	2	7	5
	1	1	1	3	4	1	4	3
	5	Term. #3 of RF800	Orange Term. of MWC-1	2	5	7	AGC Winding	2
	6	Term #4 of RF800	Black Term. of MWC-1	1	7	8	AGC Winding	1
Connect Width Coil Across	5 & 6	Term #1 & #2 of RF800 Across "T" & 1	Red & Blue Terms. of MWC-1 across "T" & 1	2 & 1	5 & 7	7 & 8	5 & 4	2 & 1
Special Note:		⑬	⑬			⑭	⑮	

⑬ If the picture is out of phase, reverse width coil primary or secondary.
⑭ If the picture is out of phase, reverse AGC winding.
⑮ Jumper terminals #9 & "T".

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA CBS Columbia Part No.	Halldorson Part No.	Merit Part No.	Stancor Part No.	Thordorson Part No.	Triad Part No.	NOTES
T8	4.8KΩ	3.4Ω	Part of Spkr.	2L07	A-3230	A-3877	24S51	S-3X	

SPEAKER

ITEM No.	RATINGS SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA CBS Columbia Part No	QUAM Part No	NOTES
SP1	8"	PM	3.4Ω	7300041①	8A21	① Used in Models 22C05, 22T09, 22T09S and 22T09EB
	5"	PM	3.4Ω	7300042①	5A1	

COILS (RF-IF)

ITEM No	USE	DC RES PRI.	DC RES SEC.	REPLACEMENT DATA CBS-Columbia Part No	MEISSNER Part No	MERIT Part No	MILLER Part No	NOTES
L1	Ant. Coils	0Ω CT	0Ω					
L2	Rect.Coil	0Ω						
L3	RF, Mixer Grid & Osc. Coils	0Ω						
L4	Fil. Choke	0Ω						
L5	Conv. Plate	.1Ω						
L6	1st. Video IF	0Ω		12000341	17-5000 *	TV-125 *	6231 *	
L7	2nd. Video IF	.6Ω	.6Ω	12000771	17-5002	TV-127	6232	Includes 41.25MC trap
L8	Fil. Choke	4.1Ω		1600015I	19-1005		4612	8.3 Microseries (SRC part #CL-3)
L9	3rd. Video IF	.1Ω	.1Ω	12000781	17-4521 ⑧	TV-128	6233	Includes 47.25MC trap
L10	Fil. Choke	6.1Ω		1600015I	19-1005		4612	8.3 Microseries (SRC part #CL-3)
L11	4th. Video IF	.3Ω	.3Ω	12000801	17-4531 ⑧	TV-128 ⑧	6216	Includes 39.75MC trap
L12	Shunt Peaking Coil	11.5Ω		16000056	19-3250	TV-185	6181	269 Microseries
L13	Series Peaking Coil	16Ω		16000055	19-3300	TV-190	6155	340 Microseries
L14	Series Peaking Coil	7Ω		16000041	19-3125		6153	118 Microseries
L15	Shunt Peaking Coil	7Ω		16000041	19-3125		6153	118 Microseries
L16	Series Peaking Coil	7Ω		16000041	19-3125		6153	118 Microseries
L17	Shunt Peaking Coil	9.5Ω		16000042	19-3180	TV-184	6180	172 Microseries
L18	Shunt IF	9Ω		16000044	19-4400	TV-190	6648	280 Microseries
L19	Ratio Det.	5.5Ω	2.4ΩCT	12000301	17-3497 *	TV-115 *	6205	Tertiary winding - 7Ω
L20	Horiz. Osc.	63Ω		1600011I	17-1576	TV-163	6210	

* Use one winding only.
⑧ Drill mounting holes.
▲ Deluxe trap.

FILTER CHOKE

ITEM No	RATINGS TOTAL DIRECT CURRENT	RATINGS D C RESISTANCE	RATINGS INDUCTANCE @ CURRENT 1000 ^(1)	REPLACEMENT DATA CBS Columbia Part No.	Halldorson Part No.	Merit Part No.	Stancor Part No.	Thordorson Part No.	Triad Part No.
L21	230ADC	70Ω	2.35 Hy.	14000021	C9031①	C-3991①		26C44	C-21X

① Drill one new mounting hole.

CBS-COLUMBIA MODELS 22C05, 22C07, B, M, 22T09, B, EB (Ch. 921-12)

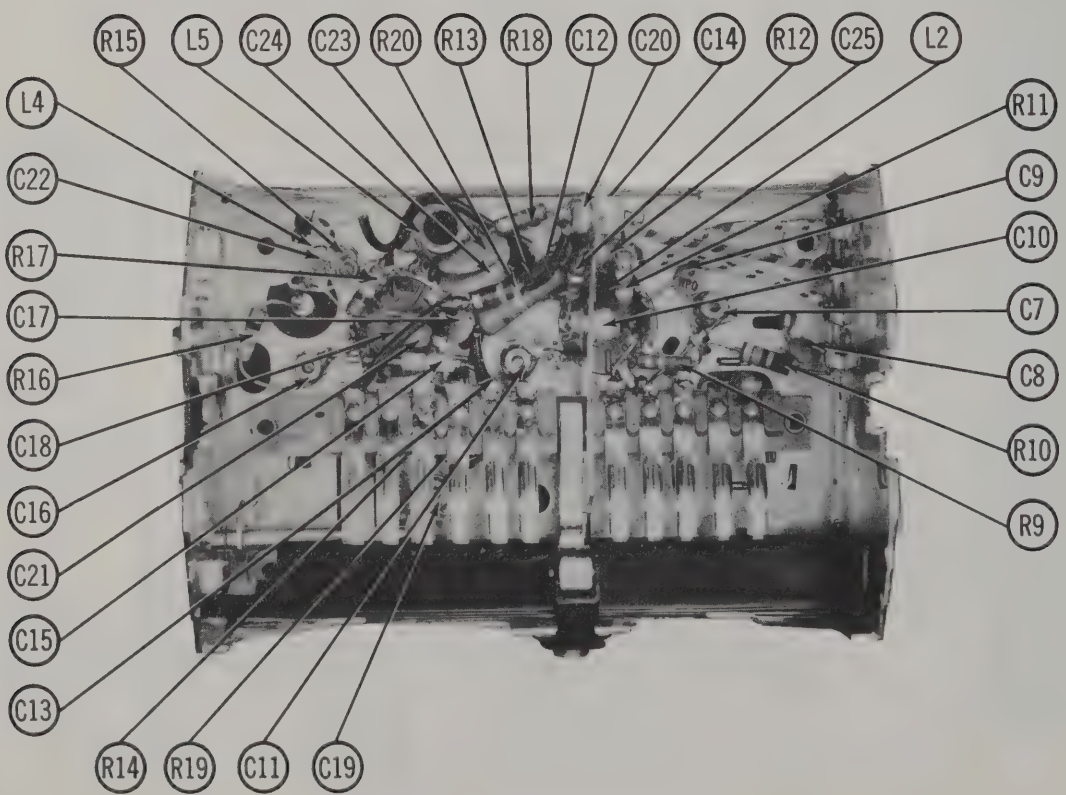
PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			CBS-Columbia PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	½A 125V	43000021		315.500 (3AG-S/B-½A)		MDV½	

MISCELLANEOUS

ITEM No.	PART NAME	CBS-Columbia PART No.	NOTES
M2A	Tuner	69000591	VHF - Not used in some versions
B	Tuner	69000151	VHF - Used in some versions
M3	Trap		VHF Ant. Input Filter - Not used in some versions
M4	Focus Magnet	19000101	Includes centering device
M5	Ion Trap	19000081	
B2	Trimmer Cap.	25000011	Horiz. Drive (120-290MMF) - Not used in some versions.
	Knob	76000741	Channel Selector - Models 22C05, 22C07, 22T09
	Knob	76000743	Channel Selector - Models 22C07B, 22C07M, 22T09B, 22T09EB
	Knob	76000711	Fine tuning
	Knob	76000731	On-off-volume - Models 22C05, 22C07
	Knob	76000732	On-off-volume - Models 22C07B, 22C07M, 22T09B, 22T09EB
	Knob	76000721	Contrast
	Knob	76000811	Brightness, tone, vert. & horiz. hold - Models 22C05, 22C07, 22T09
	Knob	76000812	Brightness, tone, vert. & horiz. hold - Models 22C07B, 22T09B, 22T09EB, 22C07M
	Safety Glass	77000356	All Models
	Mask	71000921	Models 22C05, 22C07, 22C07B, 22C07M



RF TUNER BOTTOM VIEW

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

TROUBLE SHOOTING AIDS (cont)

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V16, V17, V18 and V19. Check waveform W18.

If Satisfactory	If Unsatisfactory
Check T3, T5A, T6, T7, C94, C93, C92, R108, R109 and other associated components.	Check L20, C87, C88, C90, R104, R103, R101, R100 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V17, V18 and V20. Check T3, T5A, C90, R109 and other associated components. Check adjustments B2, B3 and B4.

BLOOMING

Check by substitution V17, V18, V19 and V20. Check C90, R109, R112 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6 and V7. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

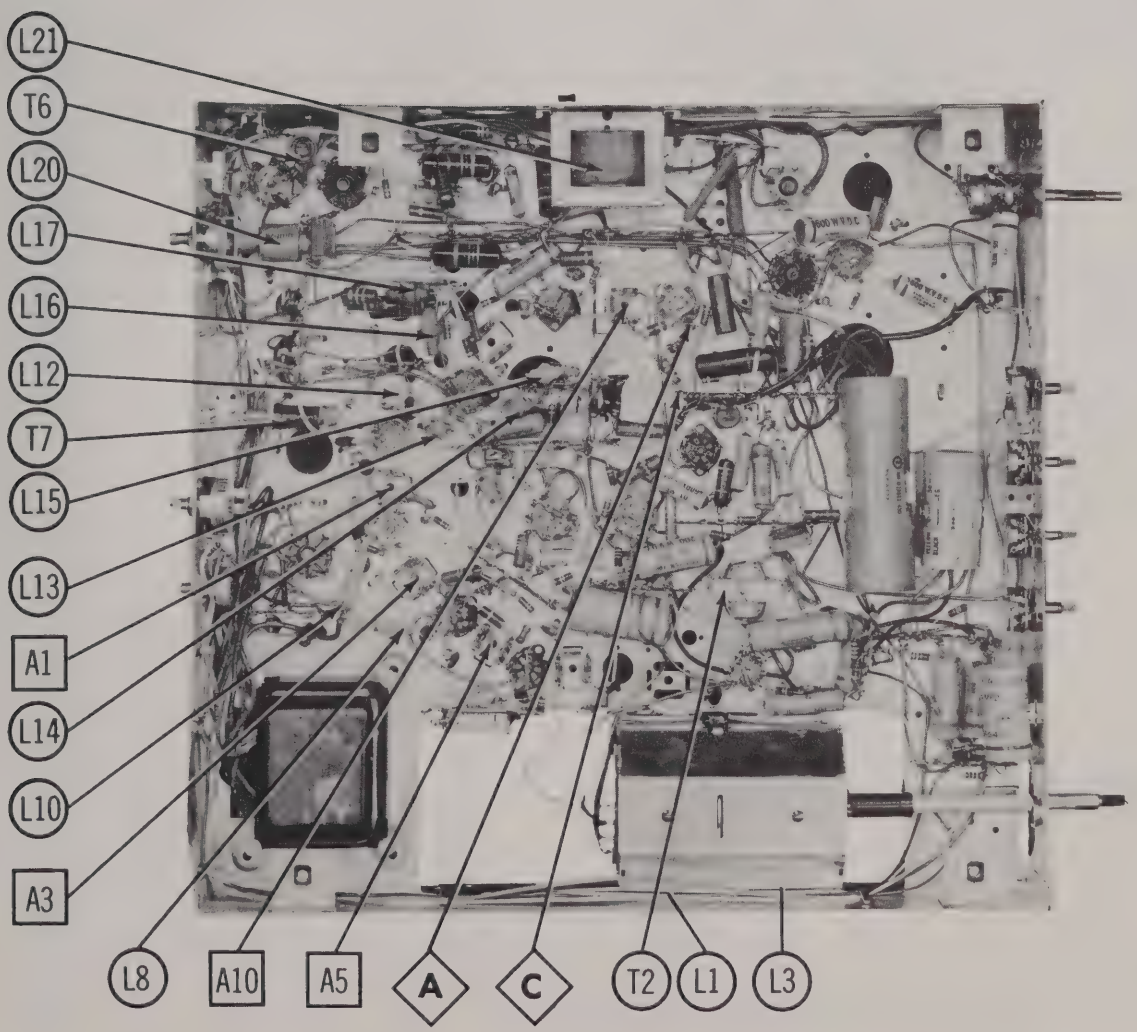
KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENT

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet above and slightly to the left of the channel selector shaft.

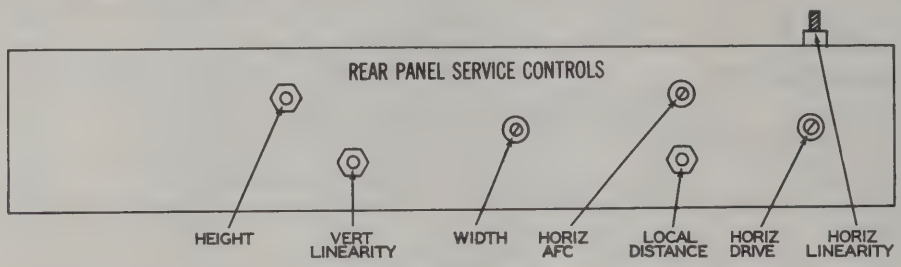
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 5 wood screws holding plastic strip at the top of the safety glass. Remove plastic strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control at the mid-range position and adjust the horizontal AFC slug (L20) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L19) located on top of chassis. (See tube replacement chart).

FUSES

One fuse is used for LV power supply protection. (For location see tube placement chart).

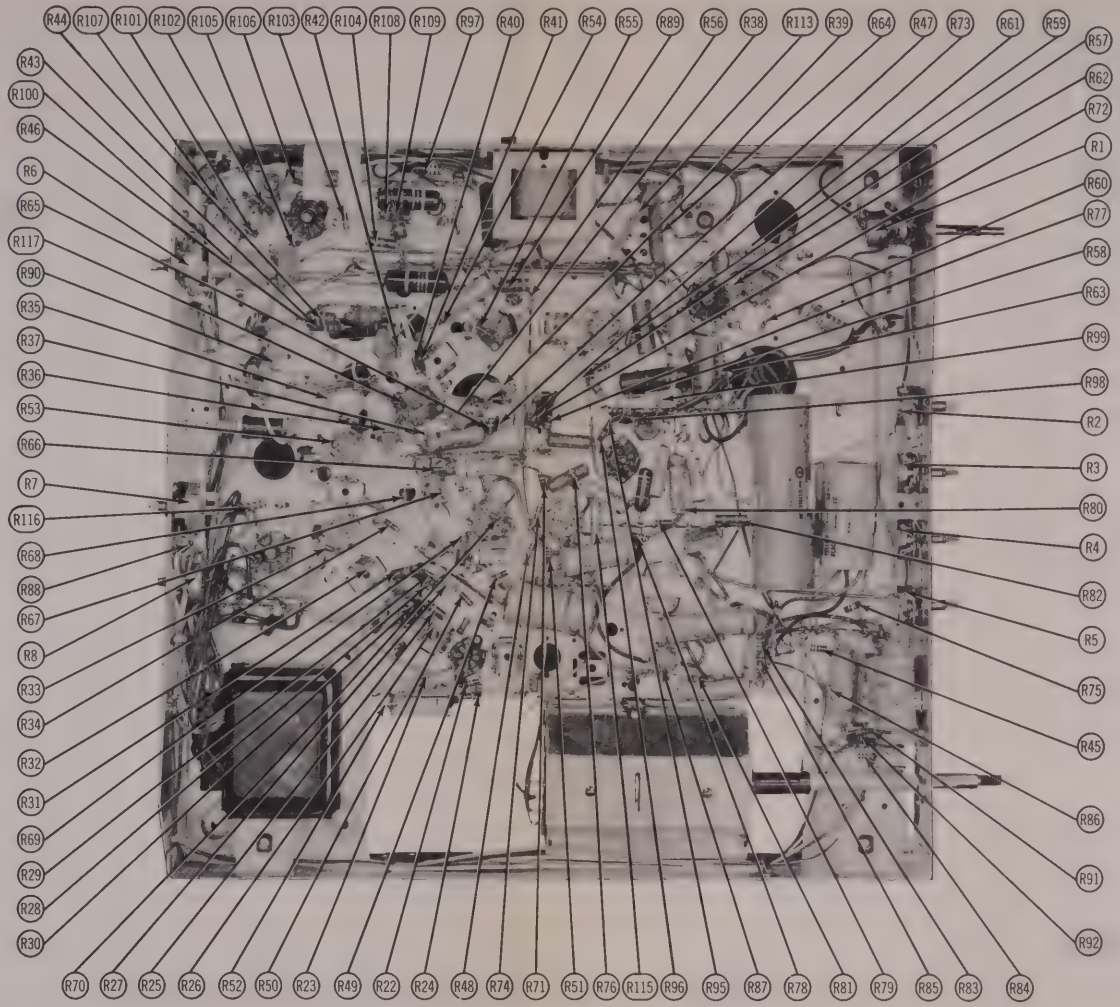
CENTERING

Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

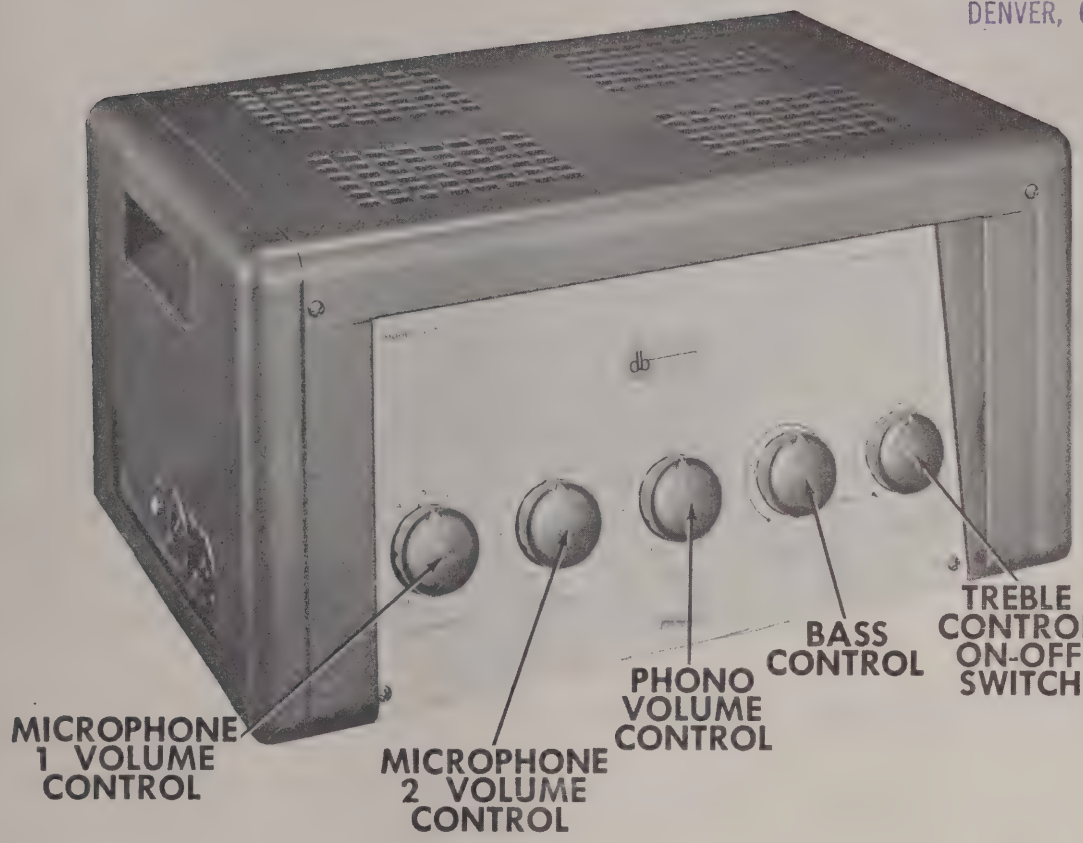
1. Remove 8 push-on type control knobs from front panel of cabinet.
2. Remove 7 wood screws and 1 metal screw. Remove rear cover.
3. Disconnect speaker plug.
4. Remove 2 wood screws. Remove antenna terminal strip.
5. Remove 4 chassis bolts. Remove chassis.
6. Remove 2 speaker nuts. Remove speaker.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

DAVID BOGEN
MODEL J-15



DAVID BOGEN
MODEL J-15

TRADE NAME	David Bogen Model J-15
MANUFACTURER	David Bogen Co., Inc., 29 Ninth Ave., New York, 14, N.Y.
TYPE SET	AC Operated 2 Channel 15 Watt Audio Amplifier
TUBES (Seven)	Types 6SF5 Mic #1 Preamp., 6SF5 Mic #2 Preamp., 6SF5 AF Amp., 6SL7GT AF Amp.-Phase Inverter, (2) 6L6G Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .8 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

DAVID BOGEN
MODEL J-15

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		David Bogen PART No.	STANDARD REPLACEMENT		
V1	Mic #1 Preamp.	6SF5	6SF5	6AB	
V2	Mic #2 Preamp.	6SF5	6SF5	6AB	
V3	AF Amp.	6SF5	6SF5	6AB	
V4	AF Amp.-Phase Inverter	6SL7GT	6SL7GT	8BD	
V5	Output	6L6G	6L6G	7S	
V6	Output	6L6G	6L6G	7S	
V7	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	David Bogen PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▬10	450	C-507			WP433.6	TM-Q5-450	S-260	
B	▲10	450							
C2A	▲5	450	C-506			WP433.6	TM-Q5-450	S-030	
B	▬5	450							
C	■5	450							
D	5	450							
C3	50	50				TC39	TD-50-50	FM-0550	
C4	.047	400		DF-503		PT4147	IMP4-S47	3304147	
C5	.033	400				PT4133	IMP6-S3	3306133	
C6	.047	400		DF-503		PT4147	IMP4-S47	3304147	
C7	.033	400				PT4133	IMP6-S3	3306133	
C8	.033	400				PT4133	IMP6-S3	3306133	
C9	.047	400		DF-503		PT4147	IMP4-S47	3304147	
C10	8200	500						C-06282	
C11	.0033	200		D6-332	GP2-333-332	PT6233	IMP6-D33	3306233	
C12	.1	400		DF-104		PT401	IMP4-P1	330401	
C13	.1	400		DF-104		PT401	IMP4-P1	330401	
C14	.033	400				PT4133	IMP6-S3	3306133	
C15	.01	600		D6-103	GP2-333-103	PT611	IMP6-S1	33061l	

CONTROLS

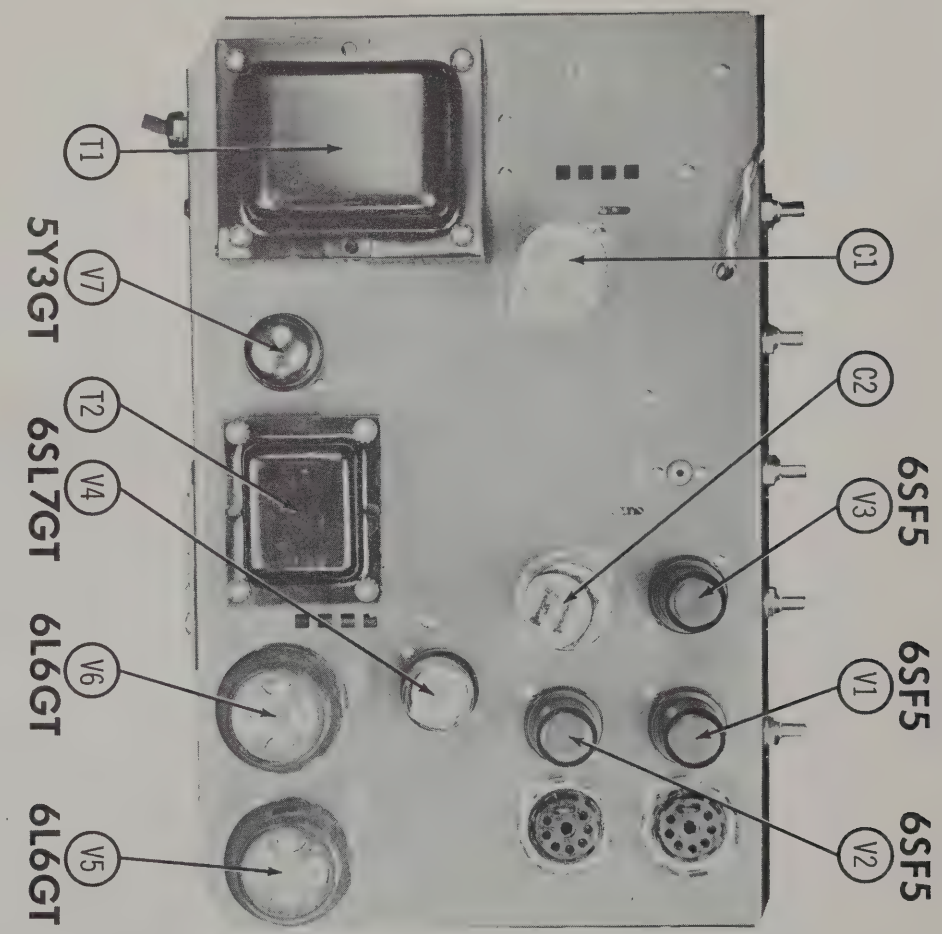
ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	David Bogen PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	V-202-C	Q13-133	A47-500K-Z	B-60	U-48	Mic. #1
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
R2A	500KΩ	½	V-202-C	Q13-133	A47-500K-Z	B-60	U-48	Mic. #2
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3A	500KΩ	½	V-202-C	Q13-133	A47-500K-Z	B-60	U-48	Phono
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A
R4	4Meg	½	V-129E					Bass-tapped @ 45KΩ
R5A	500KΩ	½	V-149B	Q13-133	A47-500K-Z	B-60-S	U-48	Treble
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R5A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R5A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	David Bogen PART No.	IRC PART No.	
R6	2.2Meg	½		BTS-2.2Meg	
R7	220KΩ	½		BTS-220K	
R8	2.2Meg	½		BTS-2.2Meg	
R9	220KΩ	½		BTS-220K	
R10	470KΩ	½		BTS-470K	
R11	220KΩ	½		BTS-220K	
R12	220KΩ	½		BTS-220K	
R13	1500Ω	½		BTS-1500	
R14	220KΩ	½		BTS-220K	
R15	100KΩ	½		BTS-100K	
R16	2200Ω	½		BTS-2200	
R17	270KΩ	½		BTS-270K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	David Bogen PART No.	IRC PART No.	
R18	6800Ω	½		BTS-6800	
R19	2200Ω	½		BTS-2200	
R20	270KΩ	½		BTS-270K	
R21	47KΩ	½		BTS-47K	
R22	10KΩ	½		BTS-10K	
R23	100KΩ	½		BTS-100K	
R24	33Ω	½		BTS-33	
R25	200Ω	7		PW7-200	
R26	100KΩ	½		BTS-100K	
R27	150KΩ	½		BTS-150K	
R28	2200Ω	1		BTA-2200	
R29	40KΩ	8		2D-40K	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	David Bogen PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @.8A	800VCT .106ADC	5VAC @2A	6.3VCT @3.1A	T-367-1			PM-8411		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	David Bogen PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5.8KΩ CT	70V tap @ 16Ω, 8Ω, 4Ω	T-271						

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	David Bogen PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L1	.104ADC	82Ω	1.6 Hy.	T502	C5040	C-2994	C-2327	26C41	C-21X ①

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			David Bogen PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	1½A 125V			31301.5 (3AG-S/B-1½A)	342001	MDL 1½A	HKP

MISCELLANEOUS

ITEM No.	PART NAME	David Bogen PART No.	NOTES
M2	Pilot Light		#47, Bayonet

CHASSIS—BOTTOM VIEW

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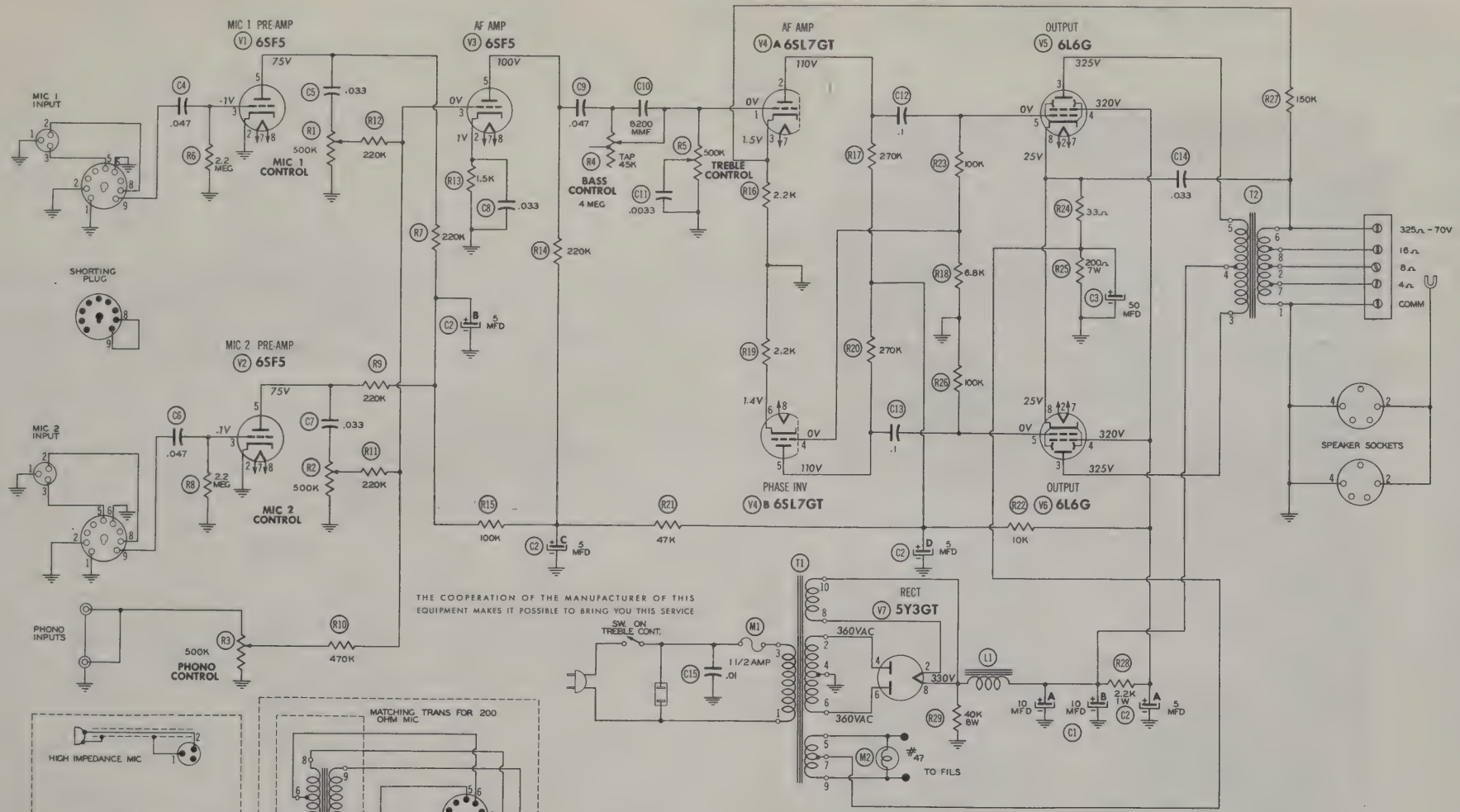
DAVID BOGEN
MODEL J-15



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SF5	0Ω	0Ω	2.2Meg	NC	†380KΩ	TP	200Ω	200Ω
V 2	6SF5	0Ω	0Ω	2.2Meg	NC	†380KΩ	TP	200Ω	200Ω
V 3	6SF5	0Ω	1.5KΩ	120KΩ	TP	†270KΩ	0Ω	200Ω	200Ω
V 4	6SL7GT	500KΩ	†280KΩ	2.2KΩ	6.8KΩ	†280KΩ	2.2KΩ	200Ω	200Ω
V 5	6L6G	TP	200Ω	†190Ω	†2.3KΩ	110KΩ	TP	200Ω	240Ω
V 6	6L[illegible]	TP	200Ω	†190Ω	†2.3KΩ	100KΩ	NC	200Ω	340Ω
V 7	5Y3GT	NC	48KΩ	NC	90Ω	NC	95Ω	NC	48KΩ

NC - NO CONNECTION
TP - TIE POINT
† MEASURED FROM PIN 8 OF V7

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 6.3 volts for voltage readings.
5. Nominal tolerance on components values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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L. F. BLANKENSHIP
3655 BLAKE ST
DENVER, COLORADO

ESPEY
MODEL 500A

ESPEY
MODEL 500A

TRADE NAME	Espey Model 500A
MANUFACTURER	Espey Mfg. Co., Inc. 528 E. 72nd St., New York 21, N. Y.
TYPE SET	AC Operated Audio Amplifier
TUBES (Eight)	Types 6J5 AF Amp., 6J5 Phase Inv., (4) 6V6GT Output, (2) 5Y3GT Rectifier
POWER SUPPLY	105-125 Volts AC - 50/60 Cycles RATING 1.35 Amp. @ 117 Volts AC

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PARTS LIST AND DESCRIPTIONS

ESPEY MODEL 500A

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		ESPEY PART No.	STANDARD REPLACEMENT		
V1	AF Amp.	6J5	6J5	6Q	
V2	Phase Inv.	6J5	6J5	6Q	
V3	Audio Output	6V6GT	6V6GT	7S	
V4	Audio Output	6V6GT	6V6GT	7S	
V5	Audio Output	6V6GT	6V6GT	7S	
V6	Audio Output	6V6GT	6V6GT	7S	
V7	Rectifier	5Y3GT	5Y3GT	5T	
V8	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	ESPEY PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲40	450				FP376.8	TM-404010-450	T-165	
B	■40	450							
C	▲10	450							
C2A	▲40	450				FP376.8	TM-404010-450	T-165	
B	■40	450							
C	▲10	450							
C3	50	50				WP202.1	TM-50-150	D-030	
C4A	■50	50				WP202.1	TM-D50-50	D-030	
B	▲50	50							
C5	.05	400		DF-503		PT415	IMP4-S5	330415	
C6	.05	400		DF-503		PT415	IMP4-S5	330415	
C7	1500			DD-152	811-152	DC5215			
C8	1500			DD-152	811-152	DC5215			
C9	250					MC240		K-1325	
C10	.05	400		DF-503		PT415	IMP4-S5	330415	

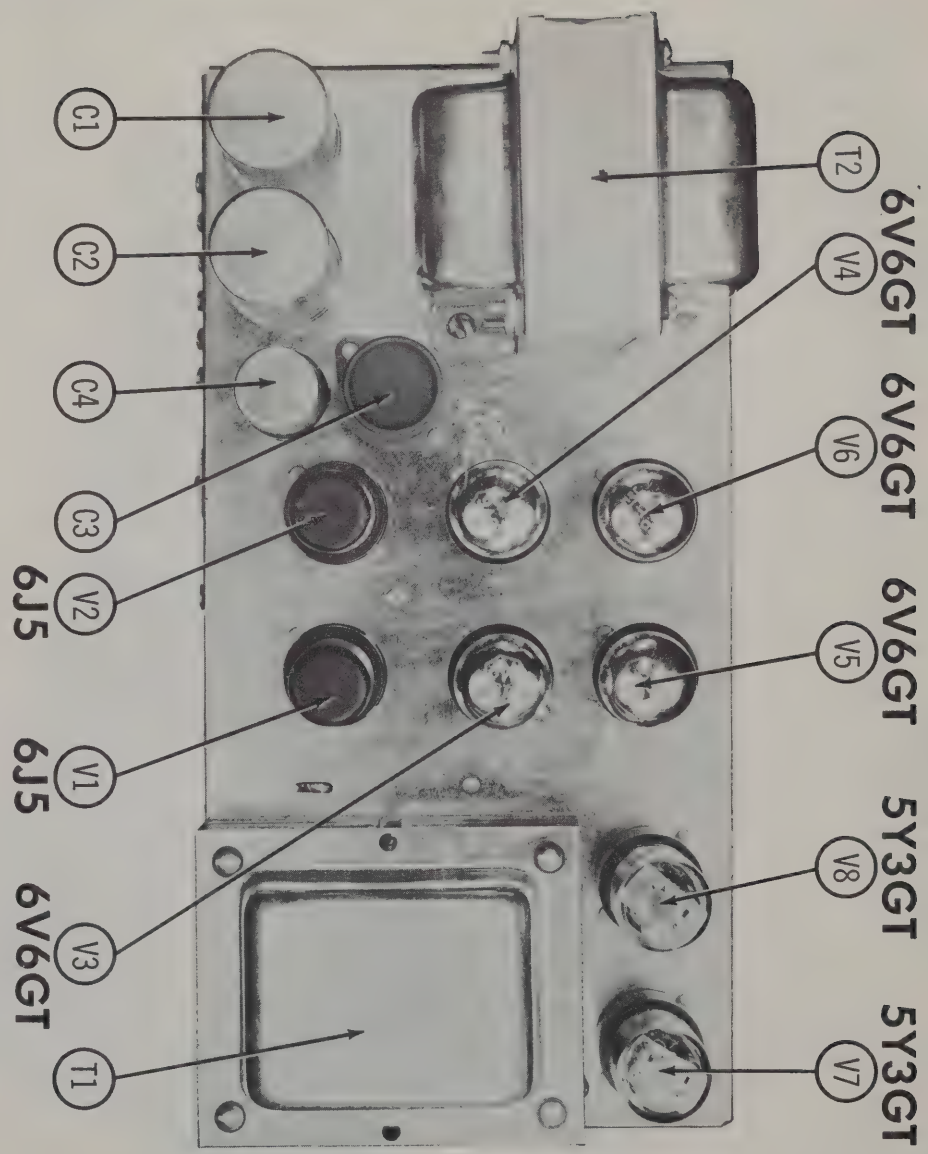
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ESPEY PART No.	IRC PART No.	
R1	470KΩ	½		BTS-470K	
R2	4700Ω	½		BTS-4700	
R3	10Ω	1			
R4	100Ω	½		BTS-100	
R5	220KΩ	½		BTS-220K	
R6	47KΩ	½		BTS-47K	
R7	47KΩ	½		BTS-47K	
R8	4700Ω	½		BTS-4700	
R9	220KΩ	½		BTS-220K	
R10	47KΩ	½		BTS-47K	
R11	39Ω	½		BTS-39	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ESPEY PART No.	IRC PART No.	
R12	39Ω	½		BTS-39	
R13	39Ω	½		BTS-39	
R14	180KΩ	½		BTS-180K	
R15	39Ω	½		BTS-39	
R16	220KΩ	½		BTS-220K	
R17	130Ω	10			
R18	4000Ω	10		1 3/4A-4000	
R19	4000Ω	10		1 3/4A-4000	
R20	730Ω	15			
R21	730Ω	15			Note 1
R22	200Ω	10		1 3/4A-200	Note 2

Note 1: Some versions use a 200Ω 10 watt resistor in this application.
Note 2: Some versions use a 730Ω 15 watt resistor in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	ESPEY PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @1.35A	610VCT .200ADC	5VAC @ 4A	6.3VAC @.89A SEC. 4 6.3VAC @5.25A	B18.128				26R33① ②	

① Use HV secondary taps, tape low taps.
② Parallel and phase 5V windings for Sec. #2.

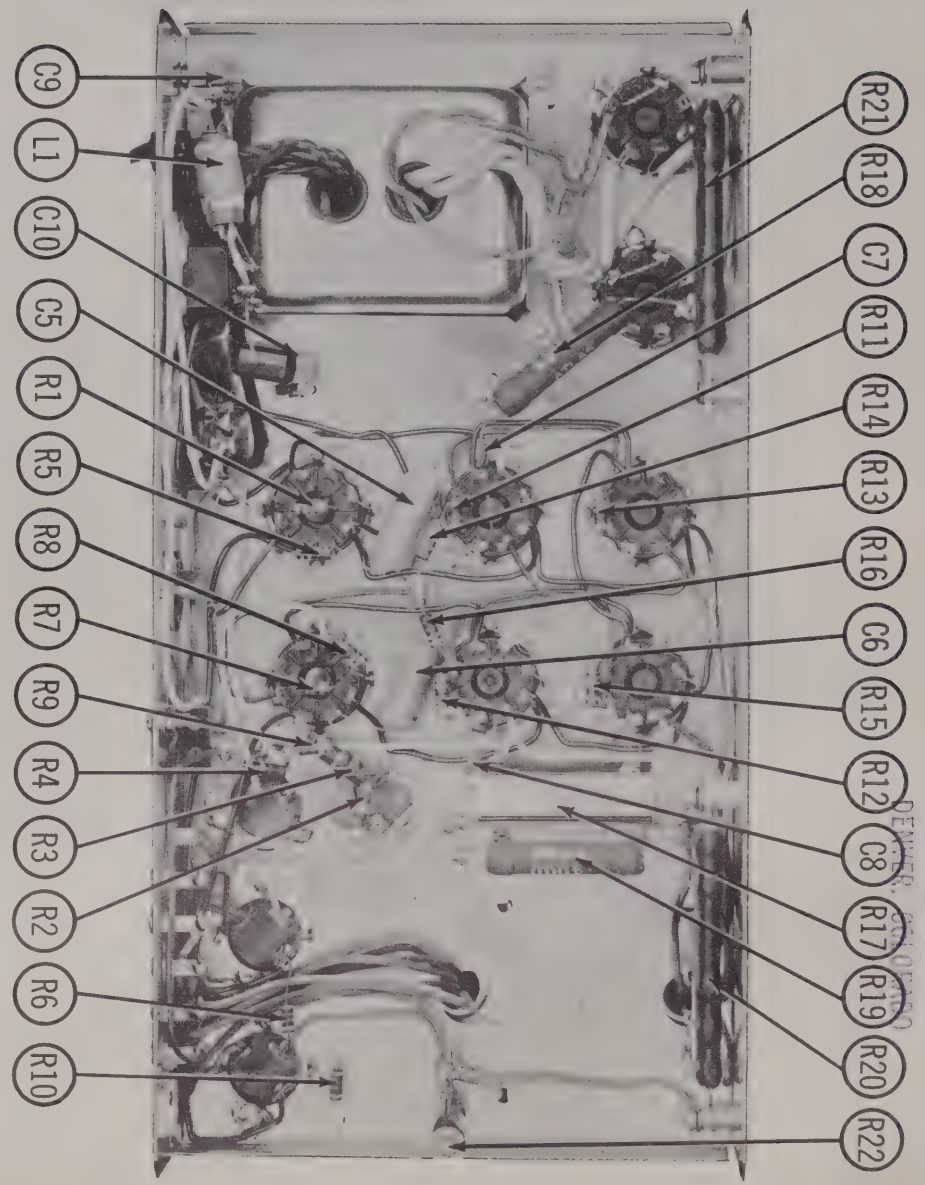
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ESPEY PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	4.1KΩ CT	500Ω Tap @250Ω @15Ω @8Ω @4Ω	B15.037		A-3129①	A-5528①	22S78①		① Drill new mounting holes.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	ESPEY PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1A	Line Choke	0Ω						2.7 Microhenries
B	Line Choke	0Ω						2.7 Microhenries

CHASSIS—BOTTOM VIEW



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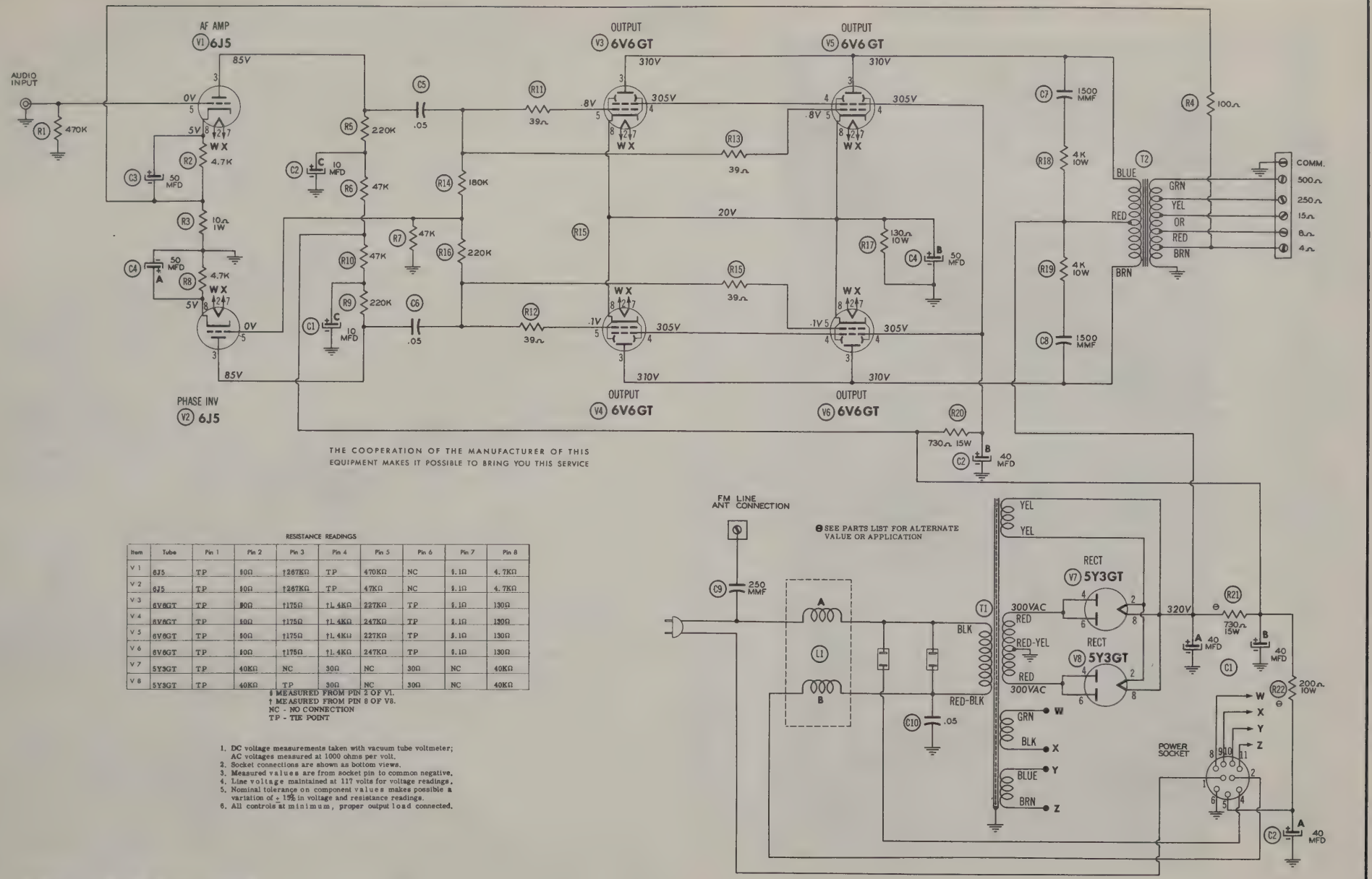
ESPEY MODEL 500A

SET 283 FOLDER 4

ESPEY MODEL 500A



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6J5	TP	$0Ω	†267KΩ	TP	470KΩ	NC	$.1Ω	4.7KΩ
V 2	6J5	TP	$0Ω	†267KΩ	TP	47KΩ	NC	$.1Ω	4.7KΩ
V 3	6V6GT	TP	$0Ω	†175Ω	†1.4KΩ	227KΩ	TP	$.1Ω	130Ω
V 4	6V6GT	TP	$0Ω	†175Ω	†1.4KΩ	247KΩ	TP	$.1Ω	130Ω
V 5	6V6GT	TP	$0Ω	†175Ω	†1.4KΩ	227KΩ	TP	$.1Ω	130Ω
V 6	6V6GT	TP	$0Ω	†175Ω	†1.4KΩ	247KΩ	TP	$.1Ω	130Ω
V 7	5Y3GT	TP	40KΩ	NC	30Ω	NC	30Ω	NC	40KΩ
V 8	5Y3GT	TP	40KΩ	TP	30Ω	NC	30Ω	NC	40KΩ

$ MEASURED FROM PIN 2 OF V1.
† MEASURED FROM PIN 8 OF V8.
NC - NO CONNECTION
TP - TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

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FIRESTONE MODELS 13-G-168, -169, -172, -173 (Codes 334-4-AM57A, 334-4-AS57A)

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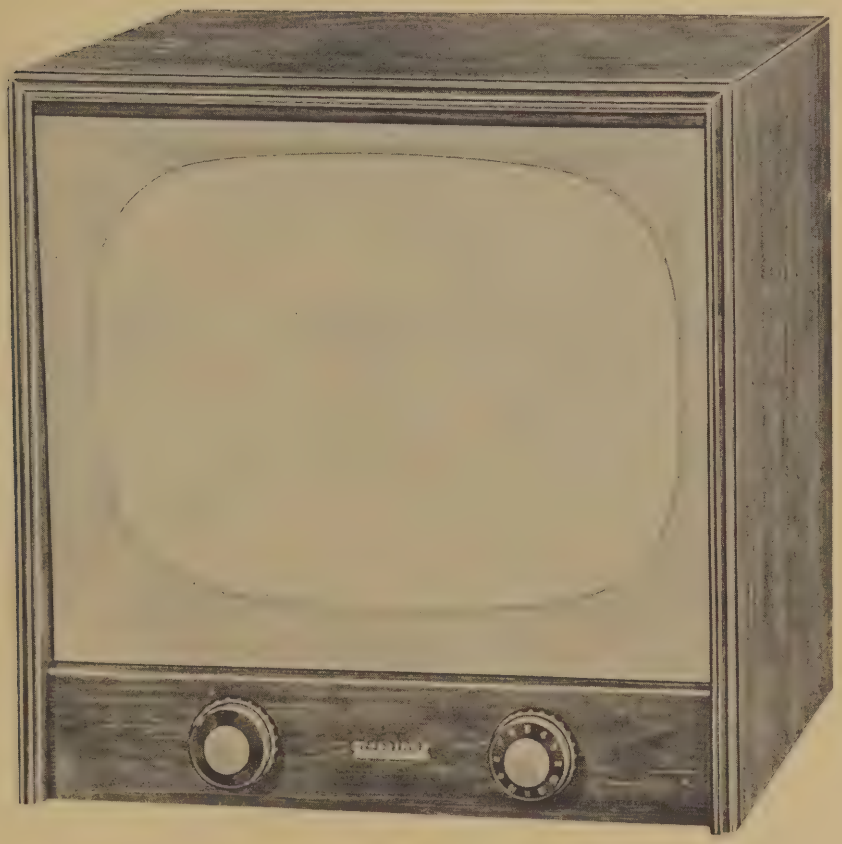

MODEL 13-G-168

FIRESTONE MODELS 13-G-168, -169, -172, -173 (Codes 334-4-AM57A, 334-4-AS57A)

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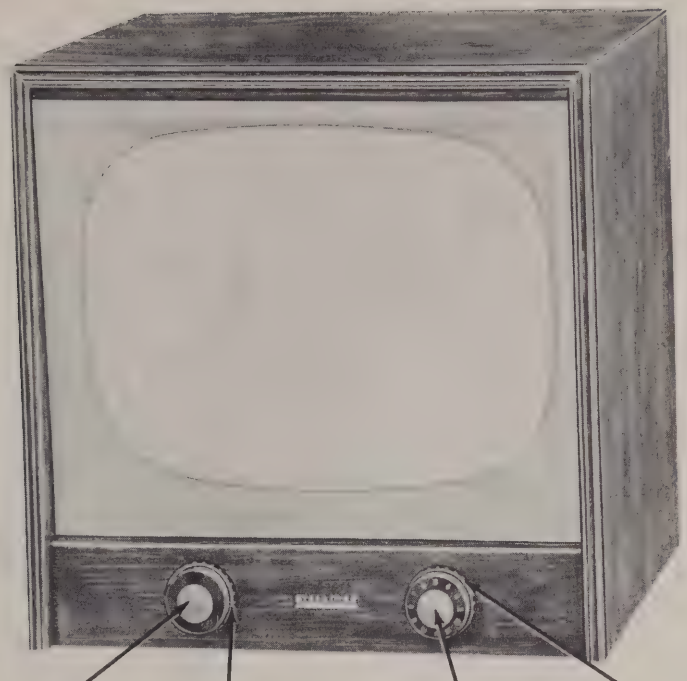

FIRESTONE MODELS 13-G-168, -169, -172, -173 (Codes 334-4-AM57A, 334-4-AS57A)

FIRESTONE MODEL 13-G-168 (Code 334-4-AM57A)

TRADE NAME	Firestone Models 13-G-168, 13-G-169, 13-G-172, 13-G-173 (Codes 334-4-AM57A, 334-4-AS57A)
SUPPLIER	Firestone Tire & Rubber Co., 1200 Firestone Parkway, Akron, Ohio
TYPE SET	Television Receiver
TUBES	Twenty
POWER SUPPLY	110-120 Volts AC - 60 Cycles RATING 1.4 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13, Video IF 26.2MC, Sound IF 21.1MC (Intercarrier)

INDEX

Alignment Instructions 6, 7
Disassembly Instructions 18
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions 14, 15,16
Photographs
Cabinet- Rear View 11
Capacitor Identification 4, 9
Chassis-Top View 3
RF Tuner 10
Resistor Identification 19, 20
Photographs (Cont)
Trans., Inductor & Alignment Identification 13
Resistance Measurements 8
Servicing in the Field 18
Schematic 2
Trouble Shooting Aids 12, 17
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

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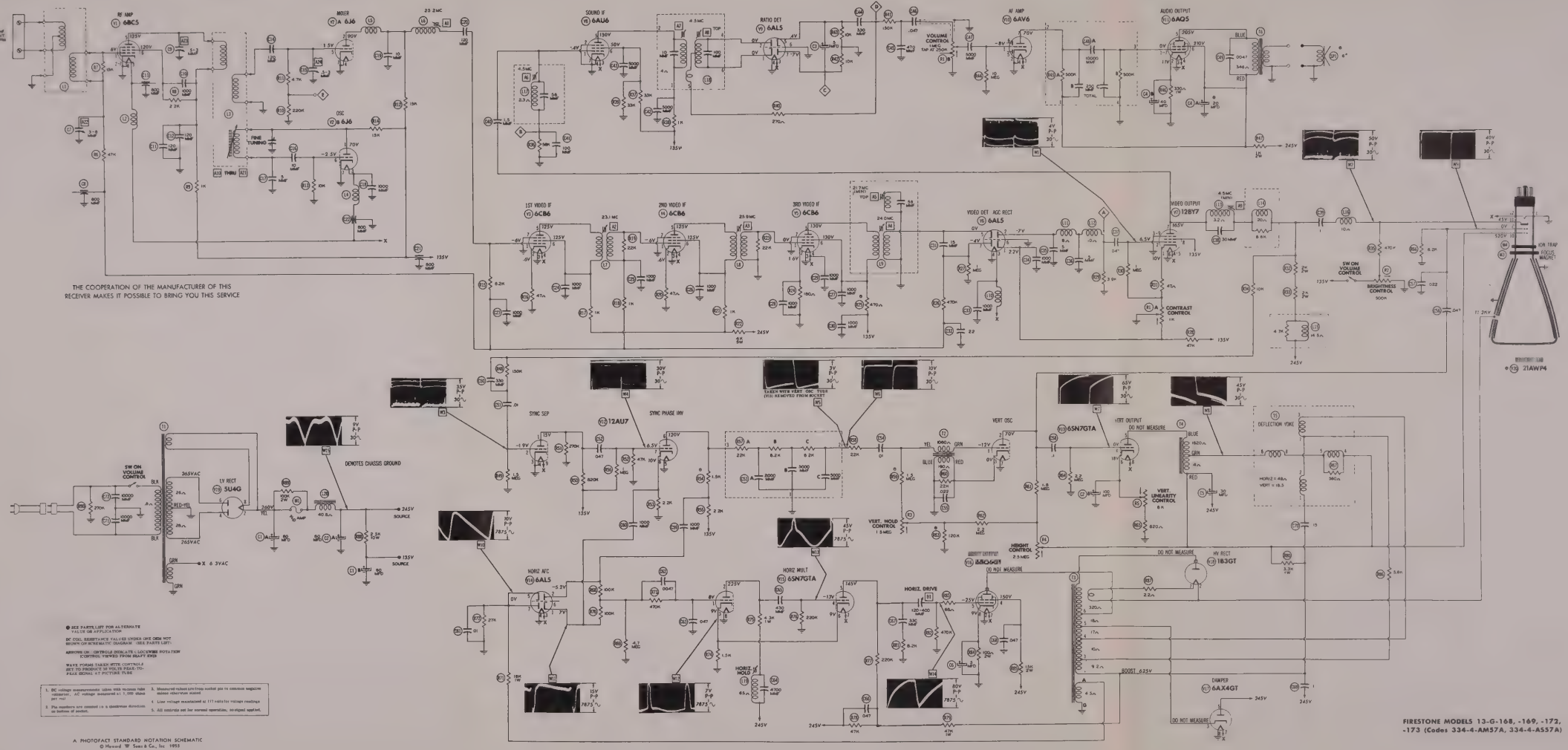

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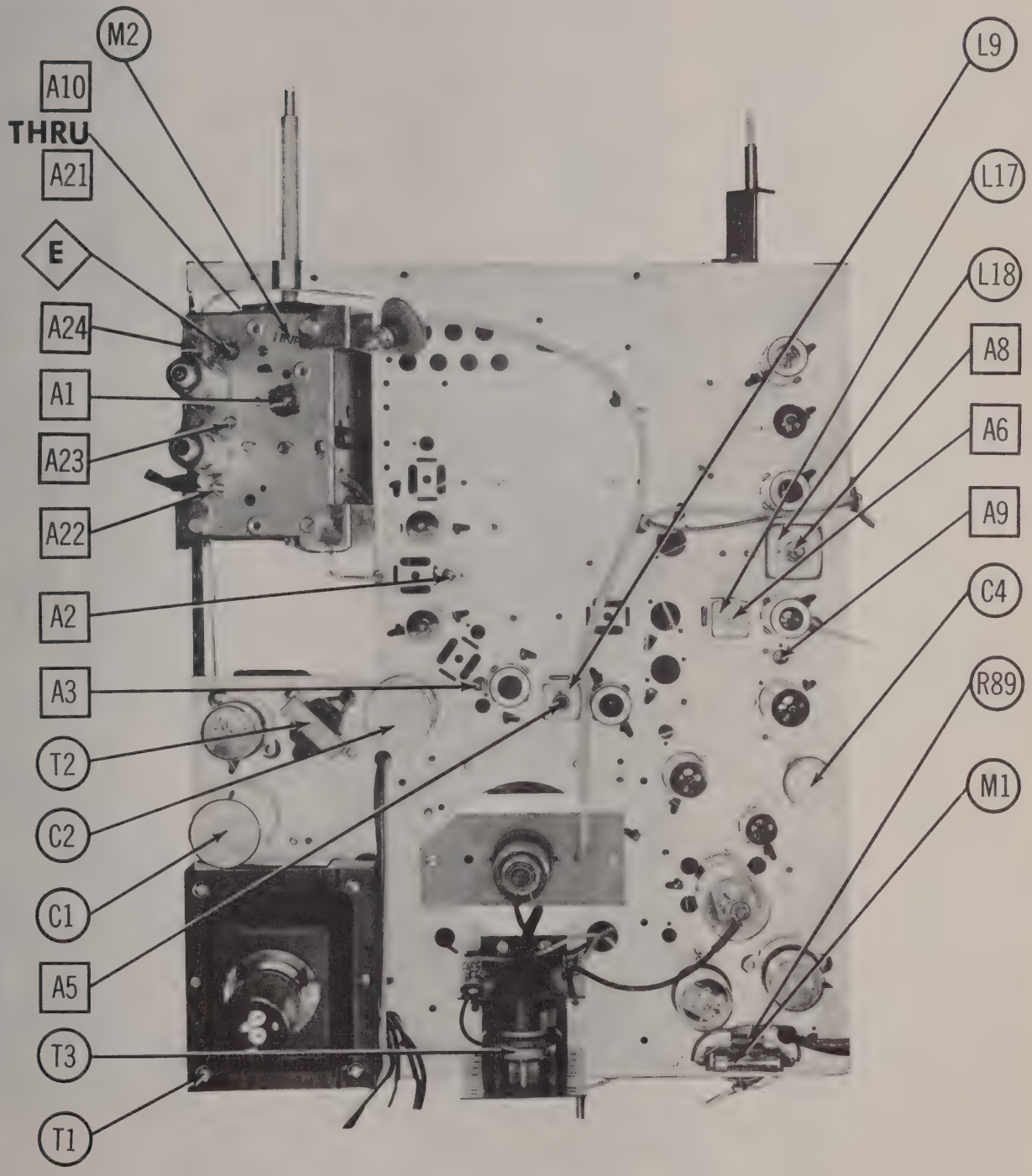
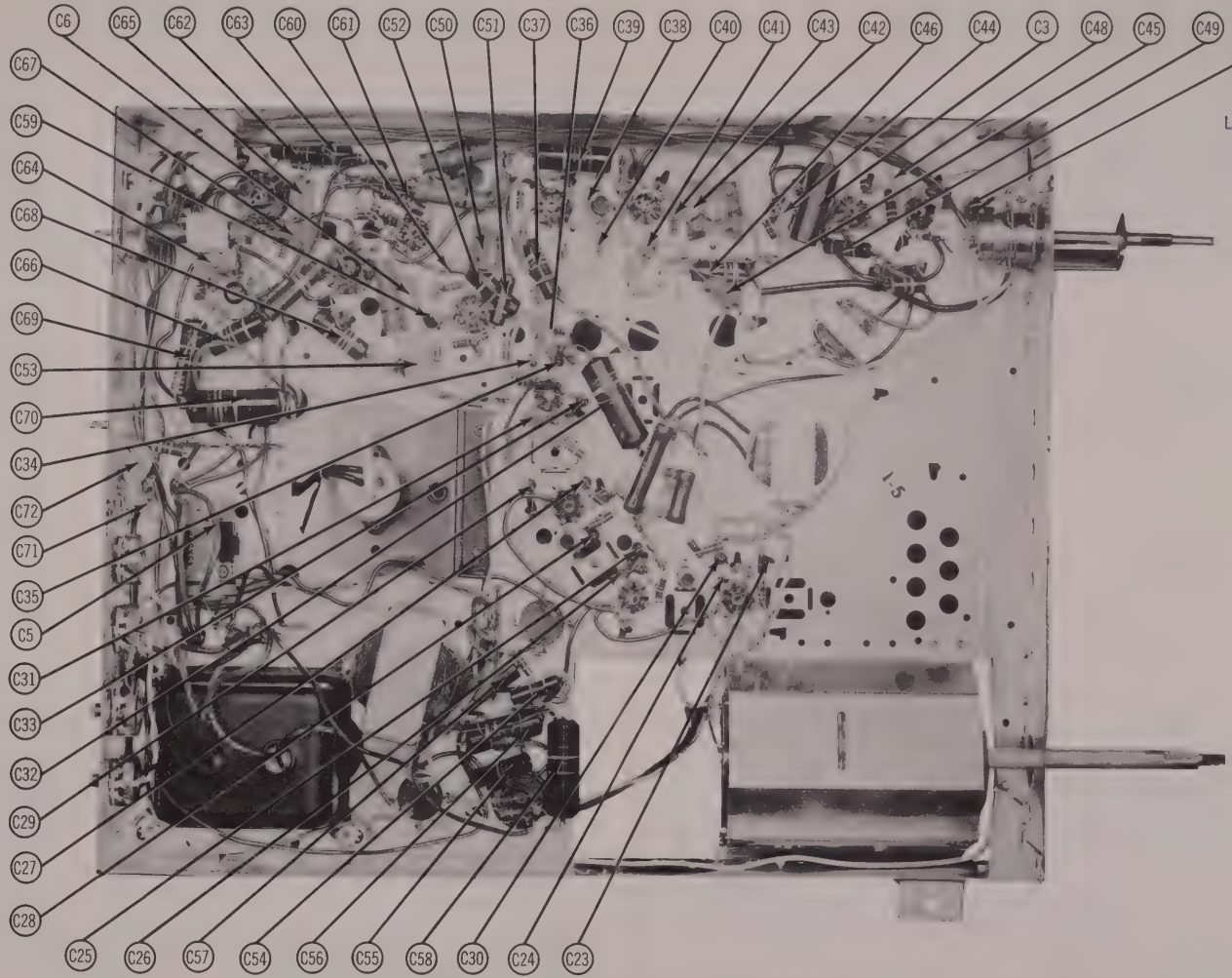


CHASSIS TOP VIEW

SET 283 FOLDER 5



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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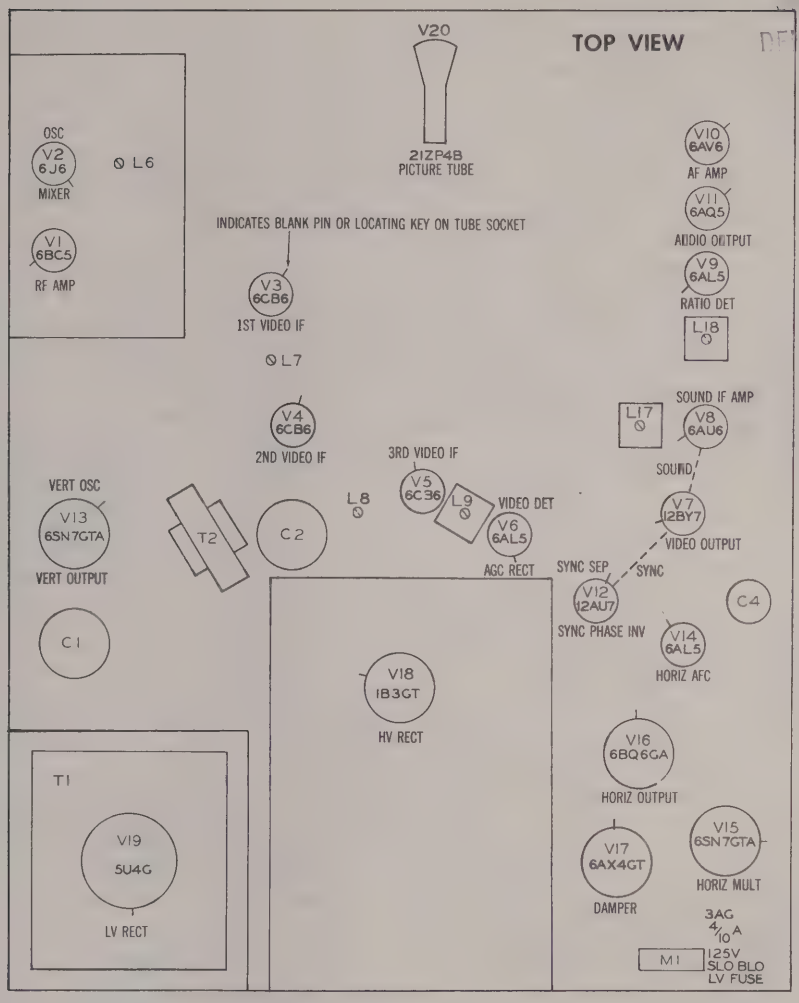
TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V19, Fuse (M1)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6, V7**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster **-V7, V20**
Has pic, no sound - **V8, V9, V10, V11**

SYNC FAILURE
No vert. sync - **V12, V13**
No horiz. sync - **V12, V14, V15**
No vert. or horiz. sync - **V12**

SWEEP FAILURE
No raster, has sound - **V15, V16, V17, V18, V20**
No vertical deflection - **V13**
Poor vert. linearity or foldover - **V13**
Poor horiz. linearity or foldover - **V15, V16, V17**
Narrow picture - **V15, V16, V17, V18, V19**
Vert. off freq. - **V12, V13**
Horiz. off freq. - **V12, V14, V15**

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard may be eliminated by removing the horizontal oscillator tube (V15).

VIDEO IF ALIGNMENT

Remove the converter tube (V2) and replace a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Connect the negative lead of a 4.5 volt bias supply to the ungrounded side of C23. Positive lead to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube.	25.2MC (Unmod)	Any	DC probe thru decoupling filter (Fig.1) to point (A). Common to chassis.	A1	Adjust for maximum deflection. Attenuate signal generator output for less than 2 volts at point (A) on VTVM.
2.	"	"	23.1MC	"	"	A2	"
3.	"	"	25.9MC	"	"	A3	"
4.	"	"	24.0MC	"	"	A4	"
5.	"	"	21.7MC	"	"	A5	Adjust for MINIMUM deflection.

OVERALL VIDEO IF RESPONSE CHECK

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Direct	High side to an ungrounded tube shield floating over dummy converter tube.	24MC (10MC Swp)	21.7MC 23.0MC 23.5MC 25.25MC 26.2MC	Any	Vert. Amp. thru decoupling filter (Fig. 1) to point (A). Common to chassis.		Check for response curve similar to Fig. 2. If necessary SLIGHTLY retouch A1 thru A4. Amplitude of the video marker (26.2MC) is controlled by A1 and A3 adjustments. Adjust A4 for flatness of response curve and replacement of 23.5MC marker. Avoid adjusting A2 unless it is absolutely necessary due to the effect it has on sound rejection. A2 places the 23.0MC marker on response curve.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Remove V5 from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point (B). Common to chassis.	A6	Adjust for maximum deflection.
8.	"	"	"	"	DC probe to point (C). Common to chassis.	A7	"
9.	"	"	"	"	DC probe to point (D). Common to chassis.	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Remove V5 from its socket.
Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. thru decoupler (Fig.1) to point (C). Low side to chassis.	A6	Disconnect stabilizing capacitor C3. Adjust for curve of maximum amplitude and symmetry as in Fig. 3.
8.	"	"	"	"	"	"	A7	"
9.	"	"	"	"	"	Vert. Amp. thru decoupler (Fig.1) to point (D). Low side to chassis.	A8	Reconnect stabilizing capacitor C3. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 4. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines. Replace V5 in its socket.

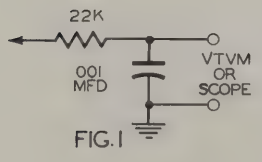


FIG.1

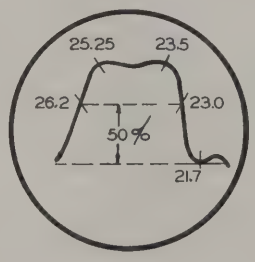


FIG.2

FIG. 3

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ALIGNMENT INSTRUCTIONS (cont)

4.5MC TRAP ALIGNMENT

Turn contrast control to maximum clockwise position.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	10KΩ	High side thru 10KΩ to point (A). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to pin 11 (cathode of picture tube). Common to chassis.	A9	Adjust for MINIMUM deflection.

OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket.
Connect bias as under "Video IF Alignment".
The oscillator screws for each channel are reached thru a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru decoupler (Fig. 1) to point (A). Low side to chassis.	A10	Adjust to place sound marker in notch as in Fig. 5. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A11	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A12	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A13	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A14	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A15	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A16	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A17	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A18	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A19	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A20	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A21	

RF AND MIXER ALIGNMENT

Connect the negative lead of a 3 volt bias supply to the ungrounded side of C23. Positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru decoupler (Fig. 1) to point (E). Low side to chassis.	A22, A23, A24	Adjust for response similar to Fig. 6 with markers above 90%.
13.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 6. If markers fall below 70% on any channel make slight compromise adjustment of A22, A23 and A24 with channel switch set to that channel. Recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

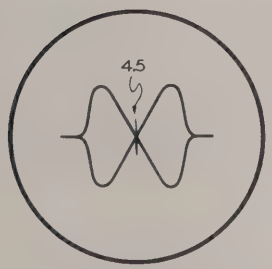


FIG. 4

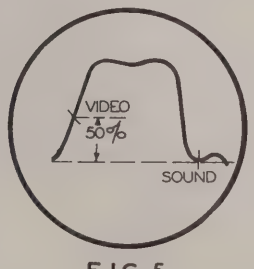


FIG. 5

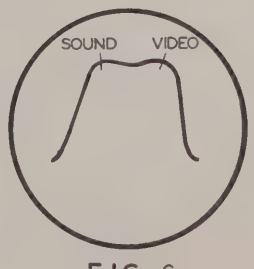
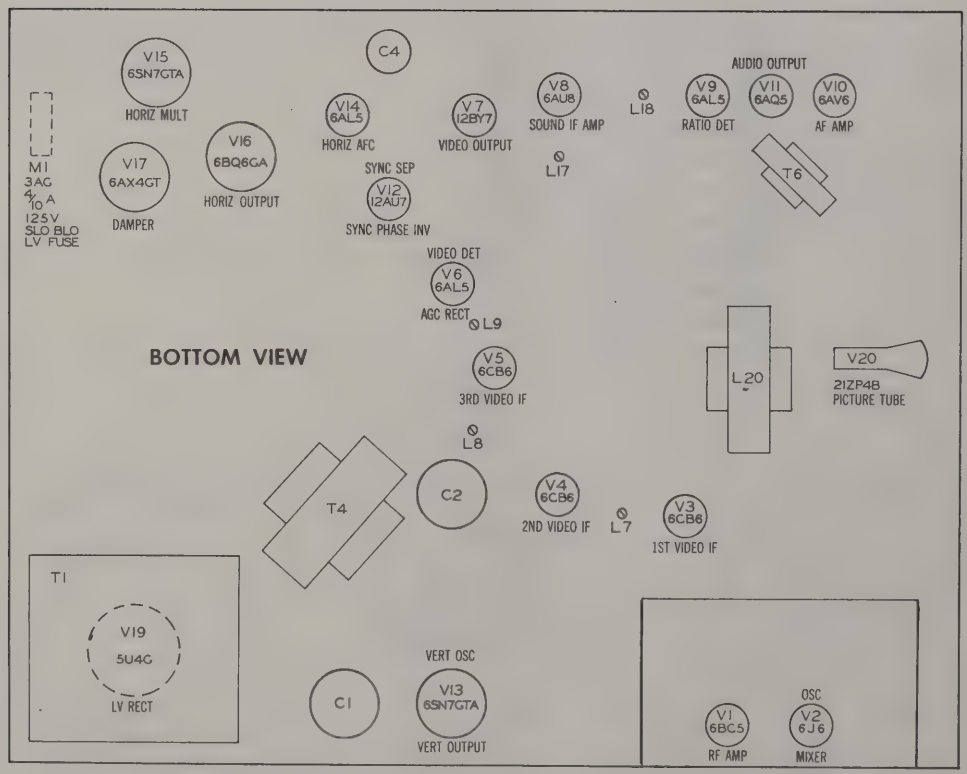


FIG. 6

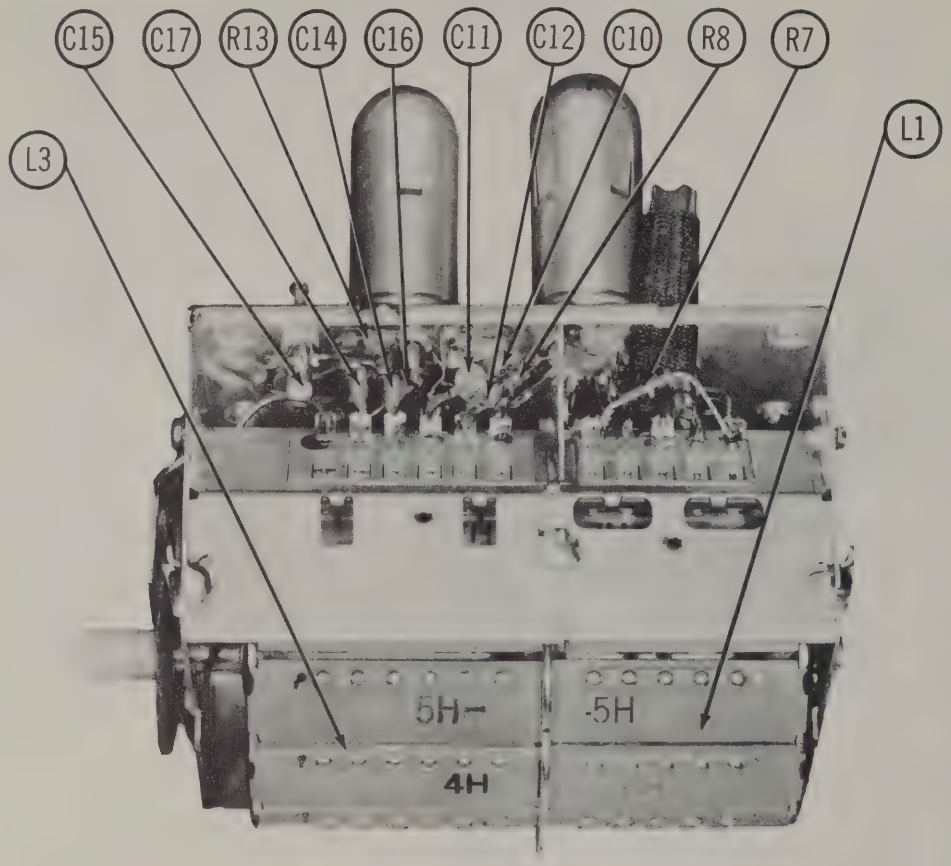
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BC5	1.5Meg	0Ω	.1Ω	0Ω	†3.5KΩ	†5.7KΩ	0Ω		
V 2	6J6	†18KΩ	†18KΩ	.1Ω	0Ω	225KΩ	10KΩ	0Ω		
V 3	6CB6	1.5Meg	47Ω	0Ω	.1Ω	†5KΩ	†5KΩ	0Ω		
V 4	6CB6	1.5Meg	47Ω	0Ω	.1Ω	†5KΩ	†5KΩ	0Ω		
V 5	6CB6	.2Ω	180Ω	0Ω	.1Ω	†3KΩ	†3KΩ	0Ω		
V 6	6AL5	700Ω	3.9KΩ	.1Ω	0Ω	.2Ω	0Ω	1Meg		
V 7	12BY7	350Ω	1Meg	0Ω	.1Ω	.1Ω	0Ω	†4KΩ	†2.5KΩ	0Ω
V 8	6AU6	56KΩ	0Ω	.1Ω	0Ω	†3.5KΩ	†25KΩ	0Ω		
V 9	6AL5	INF	INF	.1Ω	0Ω	10KΩ	0Ω	10KΩ		
V 10	6AV6	10Meg	0Ω	.1Ω	0Ω	NC	NC	†500KΩ		
V 11	6AQ5	500KΩ	330Ω	0Ω	.1Ω	†1.4KΩ	†1KΩ	500KΩ		
V 12	12AU7	†200KΩ	1.5Meg	0Ω	0Ω	0Ω	†6KΩ	45KΩ	2.2KΩ	.1Ω
V 13	6SN7GTA	2.3Meg	●2.5Meg	160Ω	2.2Meg	●5.5KΩ	1.8KΩ	0Ω	.1Ω	
V 14	6AL5	4.8Meg	4.8Meg	.1Ω	0Ω	10KΩ	NC	10KΩ		
V 15	6SN7GTA	5.2Meg	†4.3KΩ	1.5KΩ	220KΩ	†260KΩ	1.5KΩ	.1Ω	0Ω	
V 16	6BQ6GT	NC	0Ω	TP	†15KΩ	470KΩ	TP	.1Ω	100Ω	Top Cap ●18Ω
V 17	6AX4GT	TP	NC	100KΩ	TP	†40Ω	NC	.1Ω	0Ω	
V 18	1B3GT		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			Top Cap ●340Ω
V 19	5U4G	INF	25KΩ	INF	28Ω	INF	26Ω	INF	25KΩ	
V 20	21ZP4B	0Ω	8.2KΩ	Pin 10 ●3.3KΩ	Pin 11 †500KΩ	Pin 12 .1Ω				

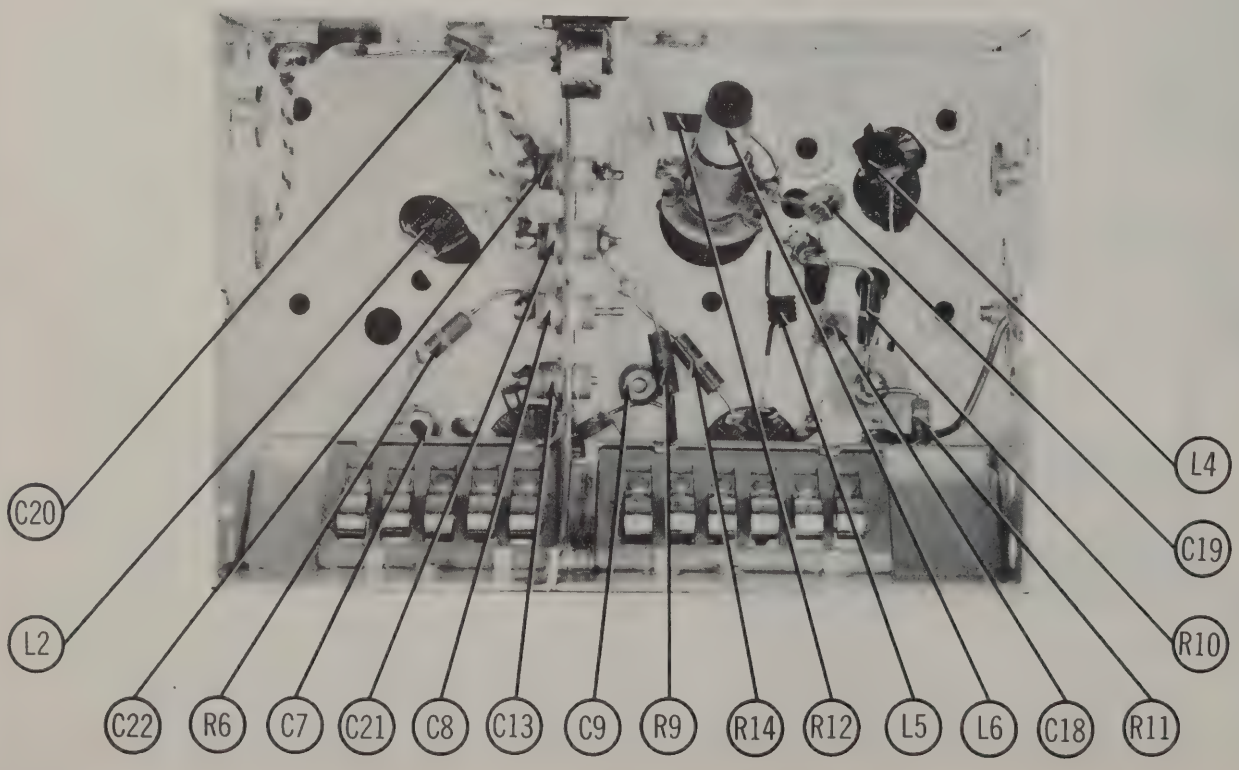
† MEASURED FROM PIN 2 OF V19.
● MEASURED FROM PIN 3 OF V17.
NC-NO CONNECTION
TP - TIE POINT



TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW

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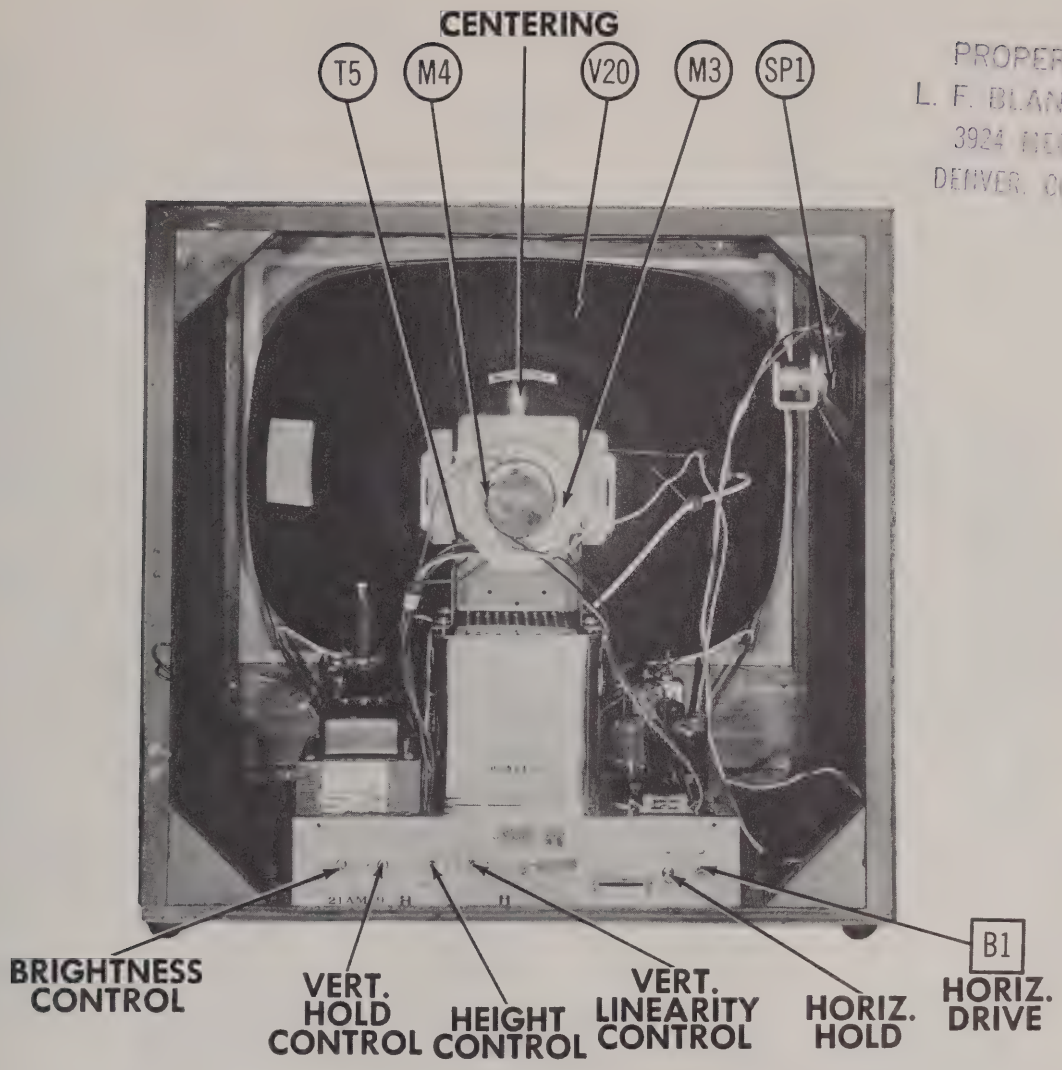

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station preferably a test pattern. Adjust the horizontal hold (L19) until the picture synchronizes horizontally. Switch off channel and back again. Picture should now be locked in sync. If not, slightly readjust L19.

Turn contrast control maximum counter clockwise and brightness control for maximum brightness. Turn the horizontal drive trimmer (B1) clockwise until white bars or compression near center of the raster appears. Then turn B1 counter clockwise until the white bars or compression disappears.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V16, V17 and V19. Check T3, T5A, R85, R84, C6 and other associated components.

DRIVE LINES

Check by substitution V16 and V17. Check adjustment B1. Check C67, R85, T3 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V16 and V17. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V15, V16 and V17. Check C63 for open. Check L19, C64, R75 and other associated components.

XMAS TREE EFFECT

Check by substitution V15, V16 and V17. Check T3 and T5A for internal arcing. Check C61, C62, C65, C64, L19, R74 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V13. Check waveform W7.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R65, R5, C2B and other associated components.	Check C58, C54, T2, R80, R61, R4 and other associated components.

INSUFFICIENT SWEEP

Substitute V13. Check height and vertical linearity controls for proper operation. Check R61, T4 and other associated components.

COMPRESSED AT BOTTOM

Substitute V13. Check R80, R61, R4, T2, C55, C58 and other associated components.

COMPRESSED AT TOP

Substitute V13. Check C2B, R65, R5, T4 and other associated components.

FOLDS

Substitute V13. Check R65, R66, C58, C57 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Substitute V12. Check C50, C51, C52, R50, R55, R54 and other associated components.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Substitute V13. Check vertical integrator network. Check C54, T2, R60, R59, R3 and other associated components.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Check by substitution V14 and V15. Check C59, C60, C62, C64, L19, R74 and other associated components.

HORIZONTAL BENDING

Check by substitution V12, V14 and V15. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V7. Check C37, C38, C39, R33, R32, R31 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A9. Check video IF alignment.

POOR CONTRAST

Substitute V7. Check L14, L15, C37, C39, R31 and other associated components.

NEGATIVE PICTURE

Substitute V7. Check picture tube. Check video detector network. Check C37, C39 and other associated components.

SMEAR

Substitute V7. Check L11, L12, L14, L15, C37, C39 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9, V10 and V11. Check stages V10 and V11 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C46, C47, C48A, C49, C4B, C4A, R47, R46, R45A, T6, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A8 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, check M1 fuse. Substitute V19. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V19. Check B+ filter and decoupling network.

PROPERTY OF
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3924 MEADE ST.
DENVER, COLORADO

CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

FIRESTONE MODELS 13-G-168, -169, -172,
-173 (Codes 334-4-AM57A, 334-4-AS57A)

PROPERTY OF
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3924 MADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: FIRESTONE PART No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BC5	6BC5	7BD	
V2	Osc.-Mixer	6J6	6J6	7BF	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Detector-AGC Rectifier	6AL5	6AL5	6BT	
V7	Video Output	12BY7	12BY7	9BF	
V8	Sound IF Amp.	6AU6	6AU6	7BK	
V9	Ratio Detector	6AL5	6AL5	6BT	
V10	AF Amplifier	6AV6	6AV6	7BT	
V11	Audio Output	6AQ5	6AQ5	7BE	
V12	Sync Separator-Sync Phase Inv.	12AU7	12AU7	9A	
V13	Vert. Osc. - Vert. Output	6BN7GTA	6BN7GTA	8BD	
V14	Horiz. AFC	6AL5	6AL5	6BT	
V15	Horiz. Osc.	6BN7GTA	6BN7GTA	8BD	
V16	Horiz. Output	6BQ8GT	6BQ8GT	6AM	
V17	Damper	6AX4GT	6AX4GT	4CG	
V18	HV Rectifier	1B3GT	1B3GT	3C	
V19	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: FIRESTONE PART No.	CBS HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V20	21AWP4 21AVP4A 21AUP4	21AWP4 21AVP4A		21AWP4		12N 13L	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	VOLT	REPLACEMENT DATA: FIRESTONE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1A	.e80	300	45X397			FP239.4	TM-D80-350	T-180	
B	.e60	300							
C2A	.e80	300	45X396			FP239.8	TM-3087	D-325	
B	.e100	50							
C3	5	25	45X378			TC30	TD-5-25	MMT-0505	
C4A	.e30	300	45X410			FP230	TM-30-300 TD-50-50	T-895	Note 1
B	.e40	50					TD-30-450	FM-4530	
C5	30	25	45X393			TC77	TD-30-25	MMT-0505	
C6	5	25	45X378			TC30	TD-5-25		
C7	5-8		25A-079	829-10					
C8	500		15D-153						
C9	.5-3		31A-056	829-3	31S-01-GR5	CT65A			
C10	1000		19LEK1S2	DD-102	801-001	DC-531			
C11	130		19LED131K	D6-121	81J-121	UC-5313			
C12	130		19LED131K	D6-121	81J-131	UC-5313			
C13	130		15D-153						
C14	130		19LED131K	D6-121	81J-121	UC-5313			
C15	.5-3		31A-056	829-3	31S-01-GR5	CT65A			
C16	10		19L10C100K	TC2-10	MP0K-100	ET-541			
C17	8		19LEU450C						
C18	1000		19LEK1S2	DD-103	801-001	DC-531			
C19	10		19L10C100K	TC2-10	MP0K-100	ET-541			
C20	130		19LED131K	D6-121	81J-131	UC-5313			
C21	800		15D-153						
C22	800		15D-153						
C23	1000		80X1	DD-102	801-001	DC-531			K-1210
C24	1000		80X1	DD-102	801-001	DC-531			K-1210
C25	1000		80X1	DD-103	801-001	DC-531			K-1210
C26	1000		80X1	DD-102	801-001	DC-531			K-1210
C27	1000		80X1	DD-102	801-001	DC-531			K-1210
C28	1000		80X1	DD-102	801-001	DC-531			K-1210
C29	1000		80X1	DD-102	801-001	DC-531			K-1210
C30	1000		80X1	DD-103	801-001	DC-531			K-1210
C31	15		47X605	D6-150	GP1K-150	UC-5415			K-1415
C32	.22	200	RCP10M2224M			PT4022	IMP2-P23	3302022	
C33	1000		80X1	DD-102	801-001	DC-531		K-1210	
C34	1000		80X1	DD-102	801-001	DC-531		K-1210	
C35	5		47X563	TC2-4.7	NP0A-050	ZT-555		KN-1550	
C36	5		47X562	TC2-4.7	NP0A-050	ZT-555		KN-1550	
C37	.047	200	RCP10M3473M	DF-503		PT4167	IMP2-847	3302167	
C38	20		47X569						
C39	.1	400	RCP10M4104M	DF-104		PT401	IMP4-P1	330401	
C40	1.5		47X584	TC2-1.5	NP0A-IR5	ZT-5515			
C41	100		47X504	D6-101	GP1K-101	UC-531		K-1210	
C42	5000		47X507	DD-502	81J-005	DC-535		C-1250	
C43	5000		47X507	DD-502	81J-005	DC-535		C-1250	
C44	330	500	47X570					KN-1333	
C45	470	500	47X525	D6-471	GP2K-471	MC345		K-1347	
C46	.047	200	RCP10M3473M	DF-503		PT4167	IMP2-847	3302167	
C47	5000		47X507	DD-502	81J-005	DC-535	IMP5-D6	C-1250	
C48A	10000								
B	330		†76X5	‡PC-80	†1604-01				
C	.0047	500	RCP10M4473M	D6-472	GP2-333-472	PT4247	IMP6-D47	3306247	
C49	330	500	47X570	D6-331	GP2K-331	UC-5333		K-1333	
C50	.01	400	RCP10M4103M	D6-103	GP2-333-103	PT411	IMP4-S1	330411	
C51	.047	400	RCP10M4473M	DF-503		PT4167	IMP4-847	3304167	
C52A	2000					DC-522	IMP6-D2	C-1230	
B	5000		‡76X7	‡PC-100	‡1605-01	DC-525	IMP5-D6	C-1250	
C	5000					DC-525	IMP5-D6	C-1350	
C54	.01	400	RCP10M4103M	D6-103	GP2-333-103	PT411	IMP4-S1	330411	
C55	.033	300	RCP10M3233M	DF-303	81T-02	PT4233	IMP4-S33	3304122	

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING: CAP.	VOLT	REPLACEMENT DATA: FIRESTONE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C56	.047	300	RCP10M6473M	DF-503		PT6147	IMP6-847	3306147	
C57	.022	300	RCP10M3223M	DF-303	81T-03	PT4122	IMP4-S22	3304122	
C58	.1	600	RCP10M6104M	DF-104		PT601	IMP6-P1	330601	
C59	1000		80X1	DD-102	801-001	DC-521	IMP6-D1	K-1210	
C60	1000		80X1	DD-103	801-001	DC-521	IMP6-D1	K-1210	
C61	.01	400	RCP10M4103M	D6-103	GP2-333-103	PT411	IMP4-S1	330411	
C62	.0047	400	RCP10M4472M	D6-472	GP2-333-472	PT6247	IMP6-D47	3306247	
C63	.047	300	RCP10M6473M	DF-503		PT4167	IMP3-847	3303167	
C64	4700	500	47X543			MCB465		CR-1247	
C65	430	500	RC42G431K					KR-1243	
C66	.047	400	RCP10M4473M	DF-503		PT4167	IMP4-847	3304167	
C67	330	500	47X570					KN-1333	
C68	.047	400	RCP10M4473M	DF-503		PT4167	IMP4-847	3304167	
C69	.1	400	RCP10M4104M	DF-104		PT401	IMP4-P1	330401	
C70	.15	400	RCP10M4154M			PT6015	IMP4-P15	3304015	
C71	10000	1000	47X615						
C72	10000	1000	47X615						

Note 1: Some versions use 10MFD for C4A.
† Items C48A, C48B, C48C, R45A, R45B are combined in one unit.
When replacing items separately C48B and C48C should total 350MMF.
‡ Items C58A, C58B, C58C, R57A, R57B, and R57C are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: FIRESTONE PART No.	IRC PART No.	CLAROSTAT	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	5000Ω	½	B7X231	*QJ-538	RTV-502	F1-4	UP13L	Contrast - Panel
B	1Meg	½				R2-58	UR16-7254	Volume tapped at 250KΩ - Rear
C	Switch					KB-2	U6-27	Attach to R1B
R2A	500KΩ	½	B40X365	QU-133	A47-500K-S	BX-59	SU-50	Brightness
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R2A
R3A	1.5Meg	½	B40X385	QU-138	A47-1.5Meg-S	BX-742	U-U5	Vert. Hold
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R3A
R4A	2.5Meg	½	B40X395A	QU-139	A47-2.5Meg-S	AB-53	SU-50	Height
B	Shaft		Not Req.	RQ	FKS-1/4	AK-4	Not Req.	Attach to R4A
R5A	3000Ω	½	B40X375	QU-116	A47-10K-S	AB-14	SU-20	Vert. Linearity
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R5A

* CONCENTRIKIT EQUIVALENT: KIT K-4, BASE ELEMENTS & SHAFTS: B1J-108 & P6-21S (PANEL)
B1J-137X & R16-31S (REAR)
76-3 SWITCH

RESISTORS

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: FIRESTONE PART No.	IRC PART No.	NOTES
R8	47KΩ	½		BTS-47K	
R7	15KΩ	½		BTS-15K	
R8	33000Ω	½		BTS-33K0	
R9	1000Ω	½		BTS-1000	
R10	120KΩ	½		BTS-120K	
R11	4700Ω	½		BTS-4700	
R12	15KΩ	½		BTS-15K	
R13	10KΩ	½		BTS-10K	
R14	15KΩ	½		BTS-15K	
R15	83000Ω 5%	½	B38X32	BTS-83K0 5%	
R16	47Ω	½	B38X70	BTS-47	
R17	1000Ω	½	B8X103	BTS-1000	
R18	10000Ω	½	B8X107	BTS-10K0	
R19	22KΩ 5%	½	B8X223	BTS-22K 5%	
R20	47Ω 5%	½	B38X470	BTS-47 5%	
R21	1000Ω	½	B8X102	BTS-1000	
R23	4000Ω	½	43X288	‡ 3/4A-4000	
R23	22KΩ 5%	½	B8X223	BTS-22K 5%	
R24	180Ω	½	B8X181	BTS-180	
R25	470Ω	½	B8X471	BTS-470	Note 1
R26	470KΩ	½	B8X474	BTS-470K	
R27	1Meg	½	B8X105	BTS-1Meg	
R28	47KΩ	½	B8X473	BTS-47K	
R29	3900Ω 5%	½	B8X392	BTS-3900 5%	
R30	1Meg	½	B8X105	BTS-1Meg	
R31	47Ω	½	B8X470	BTS-47	
R32	2000Ω 5%	2	D8X202	BTB-2000 5%	
R33	2000Ω 5%	2	D8X202	BTB-2000 5%	
R34	10KΩ	½	B8X103	BTS-10K	
R35	470KΩ	½	B8X474	BTS-470K	
R36	56KΩ	½	B8X563	BTS-56K	
R37	33KΩ	½	B8X333	BTS-33K	
R38	100KΩ	½	B8X103	BTS-100K	
R39	33KΩ	½	B8X333	BTS-33K	
R40	270Ω	½	B8X271	BTS-270	
R41	150KΩ	½	B8X154	BTS-150K	
R42	10KΩ 5%	½	B8X103	BTS-10K 5%	
R43	10KΩ 5%	½	B8X103	BTS-10K 5%	
R44	10Meg	½	B8X106	BTS-10Meg	
R45A	500KΩ	½		BTS-470K	
B	500KΩ	½	†TBX5	BTS-470K	
R46	330Ω	1	C8X331	BTA-330	
R47	1000Ω	2	D8X102	BTB-1000	
R48	150KΩ	½	B8X154	BTS-150K	
R49	1.5Meg	½	B8X155	BTS-1.5Meg	
R50	820KΩ	½	B8X824	BTS-820K	
R51	270KΩ	½	B8X274	BTS-270K	
R52	47KΩ	½	B8X473	BTS-47K	
R53	33000Ω 5%	½	B8X332	BTS-3300 5%	
R54	1500Ω	½	B8X152	BTS-1500	Note 2
R55	33000Ω 5%	½	B8X332	BTS-3300 5%	
R56	1Meg	½	B8X105	BTS-1Meg	
R57A	22KΩ	½		BTS-22K	
B	8200Ω	½	‡76X7	BTS-8200	
C	8200Ω	½		BTS-8200	
R58	22KΩ	½	B8X223	BTS-22K	
R59	1.5Meg	½	B8X155	BTS-1.5Meg	Note 3
R60	22KΩ	½	B8X223	BTS-22K	
R61	1.5Meg	½	B8X185	BTS-1.8Meg	
R62	2.2Meg	½	B8X225	BTS-2.2Meg	
R63	120KΩ	½	B8X124	BTS-120K	Note 4
R64	2.2Meg	½	B8X225	BTS-2.2Meg	
R65	8200Ω	½	B8X821	BTS-820	
R66	8200Ω	½	B8X822	BTS 8200	
R67	560Ω	½		BTS-560	
R68	100KΩ	½	B8X104	BTS-100K	
R69	4.7MΩ	½	B8X475	BTS-4.7Meg	
R70	100KΩ	½	B8X104	BTS 100K	
R71	18KΩ	½	C8X183	BTA-18K	
R72	27KΩ	½	B8X273	BTS-27K	
R73	470KΩ	½	B8X474	BTS-470K	
R74	3300Ω 5%	½	B8X332	BTS-3300 5%	
R75	43000Ω 5%	½	C8X432	BTA-4300 5%	
R76	220KΩ	½	B8X224	BTS-220K	
R77	220KΩ	½	B8X224	BTS-220K	
R78	47KΩ	1	C8X473	BTA-47K	
R79	47KΩ	1		BTA-47K	
R80	3300Ω	1	C8X332	BTA-3300	
R81	8200Ω	½	B8X822	BTS-8200	
R82	470KΩ	½	B8X474	BTS-470K	
R83	68Ω	½	B8X680	BTS-68	
R84	100Ω	3	D8X101		
R85	15KΩ	3	D8X153	BTB-15K	
R86	5600Ω	½	B8X562	BTS-5600	
R87	2.2Ω	5	43X322		
R88	2500Ω	10	43X287	1 3/4A-2500	
R89	100KΩ	½	D8X104	BTB-100K	
R90	270KΩ	½	B8X274	BTS-270K	

† Items R45A, R45B, C48A, C48B and C48C are combined in one unit.
‡ Items R57A, R57B, R57C, C53A, C53B and C53C are combined in one unit.
Note 1: Some versions may use a 1800Ω resistor in this application.
Note 2: Some versions may use a 3300Ω resistor in this application.
Note 3: Some versions may use a 2.2Meg resistor in this application.
Note 4: Some versions may use a 220KΩ resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI	SEC 1	SEC 2	REPLACEMENT DATA: FIRESTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC	5V@CT @ 2A	5VAC @ 3A	53X340A						
	SEC 3	SEC 4	SEC 5							
	@ 2VAC @ 6.3A									

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Vert. Osc. Trans.	54X10	SH702	A-3003	20VT1 ①	V405	A-8125	24S87 ①	A-97X
T3	Horiz. Osc. Trans.	53X347	FB41[1]	HVO-2[1]	232T1[1]	X110[1]	A-8253[1]	F1Y-27[1]	D-35[1]
T4	Vert. Output Trans.	51X198	21W68	A-3039	22VT1	V313 ①	A-8141 ②	24S84 ②	A-104X ③
T5A	Yoke-Horiz. (13MHz)	9A2334-1 ④	DF-602 ⑤	MDF-73 ⑤	21UD2 ⑤	Y703H4 ⑤	DY-8A ⑤	Y-4 ⑤	Y-17 ⑤
B	Vert. (46MHz)	9A2334-3 ④							

1 Drill new mounting hole(s).
2 Use original yoke network and connect as in original circuit.
3 Includes resistor R87.
4 Alternate yoke used with code 324-4-AS57A chassis.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL (ONE)(TION)	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
6	9	9	10	13	9	13	10
				Jumper		Jumper	
5	8	8	8	10 & 11	8	10 & 11	8
4	7	7	7	8	7	8	7
3	See Note 5	See Note 5	See Note 5	See Note 5 & 6	See Note 5	See Note 5 & 6	See Note 5
2							
1	RF800 Term #3	MWC-1 Orange Term		WC-1 Black Term		WC-1	
A	RF800 Term #4	MWC-1 Black Term	1	9	9	Black Term	1
G		MWC-1 Orange Term	2	8	Orange Term	WC 5	2
Connect Width Coil Across	RF800 Terms #1 & #2 across 3 & 1	MWC-1 Terms blue & red across 3 & 1				WC-5 Terms blue & red across 3 & 1	
Special Note	⑤	⑤	5	⑤	⑤	⑤	⑤ T

① Connect a 47 or 56MMF capacitor from terminal #5 to open end of R86 (original terminal #3 connection).
② If the picture is out of phase, reverse width coil primary or secondary.
③ Jumper terminals #9 & "T".

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI	SEC	REPLACEMENT DATA: FIRESTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T6	4.75K[1]	3.7Ω	51X167	A-3877	A-3028	S-6X	Z1107	24S51	

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: FIRESTONE PART No.	QUAM PART No.	NOTES
SP1	6"	PM	3.7Ω	12A516	6A2I	① Used in console models.
	8"	PM	3.7Ω	12A522 [1]	8A2I	

COILS (RF-IF)

ITEM No.	USE	DC RES: PRI	SEC	FIRESTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1A	Ant. Coil	0Ω CT	0Ω	9A2337-2				Channel 2
B	Ant. Coil	0Ω CT	0Ω	9A2337-3				Channel 3
C	Ant. Coil	0Ω CT	0Ω	9A2337-4				Channel 4
D	Ant. Coil	0Ω CT	0Ω	9A2337-5				Channel 5
E	Ant. Coil	0Ω CT	0Ω	9A2337-6				Channel 6
F	Ant. Coil	0Ω CT	0Ω	9A2337-7				Channel 7
G	Ant. Coil	0Ω CT	0Ω	9A2337-8				Channel 8
H	Ant. Coil	0Ω CT	0Ω	9A2337-9				Channel 9
I	Ant. Coil	0Ω CT	0Ω	9A2337-10				Channel 10
J	Ant. Coil	0Ω CT	0Ω	9A2337-11				Channel 11
K	Ant. Coil	0Ω CT	0Ω	9A2337-12				Channel 12
L	Ant. Coil	0Ω CT	0Ω	9A2337-13				Channel 13
L2	Fil Choke	0Ω		34A-546				
L3A	RF, Mixer Grid & Osc. Coils	0Ω		9A2338-2				Channel 2
B	RF, Mixer Grid & Osc. Coils	0Ω		9A2338-3				Channel 3
C	RF, Mixer Grid & Osc. Coils	0Ω		9A2338-4				Channel 4

FIRESTONE MODELS 13-G-168, -169, -172, -173 (Codes 334-4-AM57A, 334-4-AS57A)

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA FIRESTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
D	RF, Mixer Grid & Osc. Coils	0Ω		9A2338-5				Channel 5
E	RF, Mixer Grid & Osc. Coils	0Ω		9A2338-6				Channel 6
F	RF, Mixer Grid & Osc. Coils	0Ω		9A2338-7				Channel 7
G	RF, Mixer Grid & Osc. Coils	0Ω		9A2338-8				Channel 8
H	RF, Mixer Grid & Osc. Coils	0Ω		9A2338-9				Channel 9
I	RF, Mixer Grid & Osc. Coils	0Ω		9A2338-10				Channel 10
J	RF, Mixer Grid & Osc. Coils	0Ω		9A2338-11				Channel 11
K	RF, Mixer Grid & Osc. Coils	0Ω		9A2338-12				Channel 12
L	RF, Mixer Grid & Osc. Coils	0Ω		9A2338-13				Channel 13
L4	Fil. Choke	0Ω		34A-575				
L5	RF Choke	0Ω		31B638-1				
L6	1st. Video IF	.9Ω		31A-078				
L7	2nd. Video IF	.2Ω	.2Ω	9A2230	17-1062	TV-116	6249	
L8	3rd. Video IF	.2Ω	.2Ω	9A2230	17-1063	TV-116	6250	
L9	4th. Video IF	.2Ω	.2Ω	9A2333				Includes 21.7MC trap
L10	Fil. Choke	0Ω		9A2033	19-1002		4606	2.2 Microhenries
L11	Series Peaking Coil	8Ω		36A30	19-3075		4630	60 Microhenries
L12	Series Peaking Coil	10Ω		36A1	19-3100	TV-181	6177	100 Microhenries
L13	4.5MC Trap	3.2Ω		9A2336	20-1004	TV-151	1469	
L14	Series Peaking Coil	20Ω		36A28	19-3300 *	TV-190 *	6155 *	350 Microhenries, wound on 6.8KΩ resistor
L15	Shunt Peaking Coil	14.5Ω		36A29	19-3180 ■	TV-184 ■	6154 ■	190 Microhenries, wound on 4.7KΩ resistor
L16	Series Peaking Coil	10Ω		36A1	19-3100	TV-181	6177	100 Microhenries
L17	Sound IF	2.3Ω		9A2201	17-3495	TV-113	6203	
L18	Ratio Detector	4Ω	.6ΩCT	9A2295	17-3497	TV-115	6205	Tertiary winding -.5Ω
L19	Horiz. Osc.	65Ω		9A2273	19-1576	TV-163	6210	

* Parallel with 6.8KΩ resistor.

■ Parallel with 4.7KΩ resistor.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA FIRESTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L20	.230A	40.6Ω	.83HY	52X95	C-2326 ①	C-2996 ①	C-23X ①	C5037 ①	26C44

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA FIRESTONE PART No. FUSE	FIRESTONE PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG S/B	4/10A 125V	16X147-3	16X146	313.400 (3AG-S/B-4/10A)	357001	MDL 4/10	4405

MISCELLANEOUS

ITEM No.	PART NAME	FIRESTONE PART No.	NOTES
M2	Tuner	25A1120	VHF
M3	Focus Magnet	2A438-3	Includes centering device (Code 334-4-AS57A uses centering magnet part #2A435)
M4	Ion Trap	2A421	
B1	Trimmer Cap.	17A269	Horiz. Drive (120-400MMF)
	Knob	10A820-2	Beige - Fine tuning
	Knob	10A840-2	Beige - Contrast
	Knob	10A812-3	Beige - Channel Selector
	Knob	10A841-2	Beige - On-off- volume
	Knob	10A820-1	Maroon - Fine tuning
	Knob	10A840-1	Maroon - Contrast
	Knob	10A812-1	Maroon - Channel Selector
	Knob	10A841-1	Maroon - On-off-volume
	Safety Glass	17X181	
	Mask	4X1230-1	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

TROUBLE SHOOTING AIDS (cont)

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V15, V16, V17 and V18. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check T3, T5A, C69, C70, C68, R85, R84 and other associated components.	Check L19, C62, C64, C65, R78, R77, R75 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V16, V17 and V19. Check R85, C65 and C6. Check adjustment B1 and other associated components.

BLOOMING

Check by substitution V16, V17, V18 and V19. Check C67, C6, C65, R85, R81 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6 and V7. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set !"

KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet to the right of the channel selector shaft.

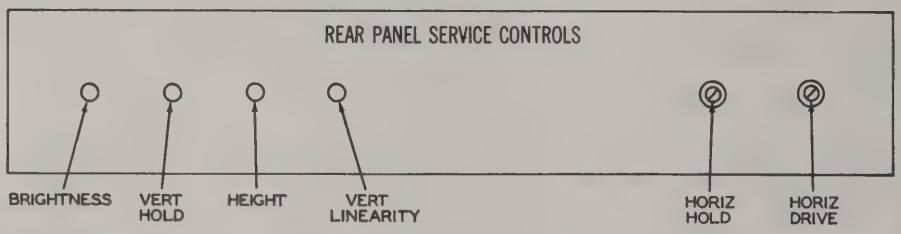
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 5 wood screws holding metal strip at top of safety glass. Remove metal strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator (L19) can be made from rear panel of the chassis. L19 is used as the horizontal hold control. Adjust L19 until picture synchronizes horizontally . Check by switching off channel and back again.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L18) located on top of the chassis. (See tube placement chart for location).

FUSES

One fuse is used for LV power supply protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 4 push-on type control knobs from front panel of cabinet.
2. Remove 4 wood screws. Remove rear cover.
3. Disconnect speaker leads.
4. Remove 5 chassis bolts. Remove chassis.
5. Remove 4 speaker nuts. Remove speakers.

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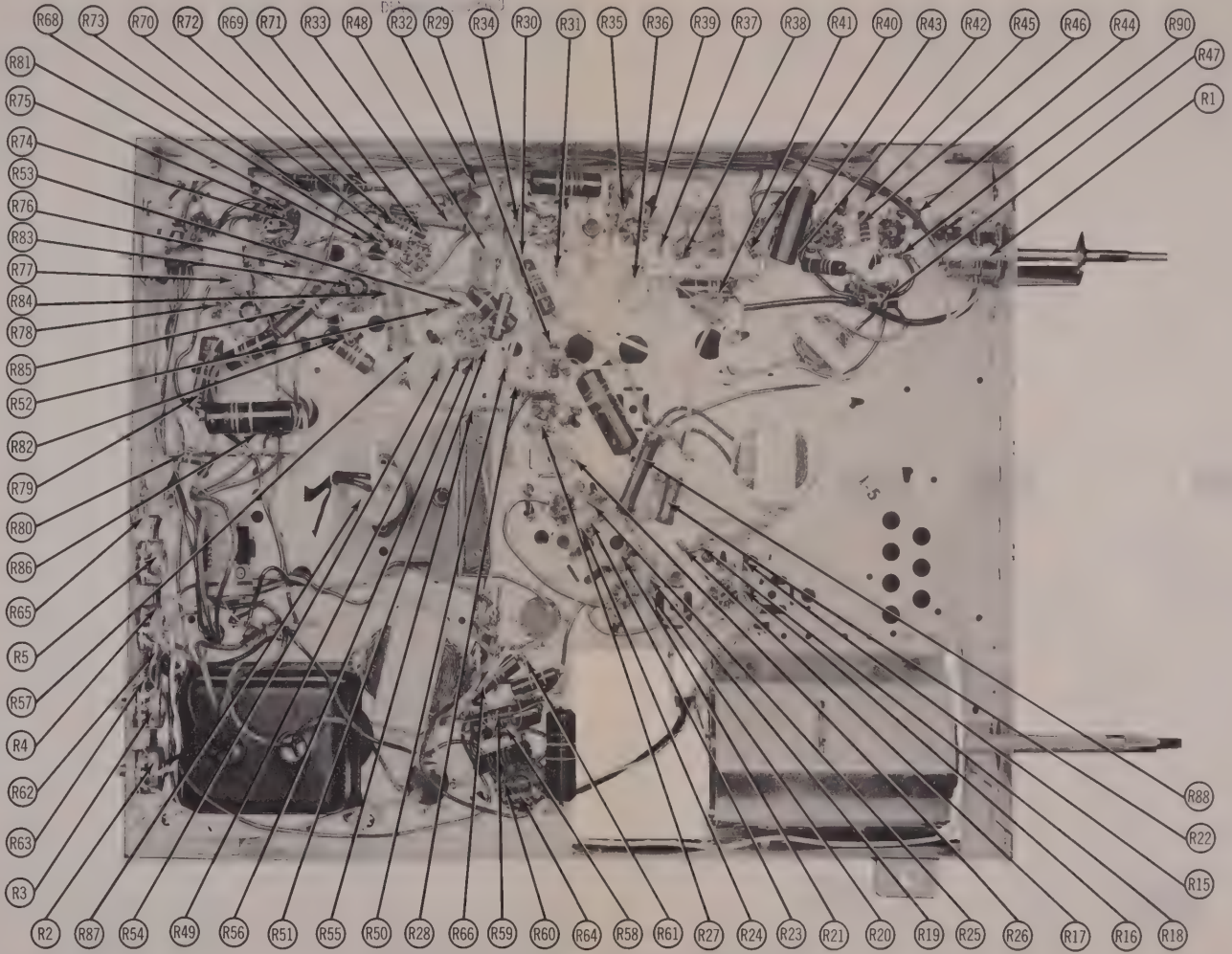
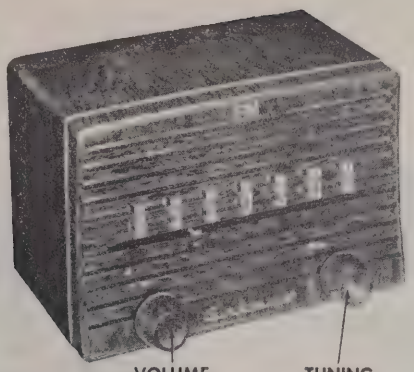


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



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DENVER, COLO. 80211

TRADE NAME	Granco Model 610
MANUFACTURER	Granco Products, Inc. 36-17 20th Ave., Long Island City 5, N. Y.
TYPE SET	AC-DC Operated FM Superheterodyne Receiver
TUBES (Six)	Types 12BA6 RF Amp., 12AT7 Mixer-Osc., 12BA6 IF Amp., 12BA6 Limiter, 19T8 Ratio Det-AF Amp., 35C5 Output
POWER SUPPLY	110-120 Volts AC - DC RATING .32 Amp. @ 117 Volts AC
TUNING RANGE— FM	88MC - 108MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and chassis.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR & VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to point A. Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference.	DC probe to point B. Common to chassis.	A1, A2, A3, A4, A5	Adjust for maximum deflection.
2.	"	"	"	"	"	DC probe to point C.	A6	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR & OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120Ω sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to point A. Low side to chassis.	10.7MC (unmod)	FM	Point of non-interference.	Vert. amp. to point B. Low side to chassis.	A1, A2, A3, A4, A5	Disconnect stabilizing capacitor (C2). Adjust for maximum amplitude and symmetry with 10.7MC occuring at center of response curve similar to Fig. 1.
2.	"	"	"	"	"	Vert. amp. to point C.	A6	Reconnect stabilizing capacitor. Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A5 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
3.	270Ω carbon resistors	High side to antenna terminal. Low side to chassis.	87.75MC	FM	87.75MC	DC probe to point B. Common to chassis.	L3, L4	Compress or expand for maximum deflection.
4.	"	"	108.25MC	"	108.25MC	"	A7, A8	Adjust for maximum deflection. Repeat steps 3 & 4.
5.	"	"	95MC	"				Set pointer (if necessary) to 95MC on dial scale.

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PARTS LIST AND DESCRIPTIONS

GRANCO MODEL 610

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: GRANCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amp.	12BA6	12BA6	7BK	
V2	Mixer-Osc.	12AT7	12AT7	9A	
V3	IF Amp.	12BA6	12BA6	7BK	
V4	Limiter	12BA6	12BA6	7BK	
V5	Ratio Det-AF Amp.	19T8	19T8	9E	
V6	Audio Output	35C5	35C5	7CV	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: GRANCO PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲80	150	AC471			FP216	TM-8050-150	D-085	
B	■50	150							
C2	2	50				TC302	TD-2-50	MMT-0505	
C3	10			D6-100	GP1K-100	UC-541		K-1410	
C4	50			D6-500	GP1K-500	UC-545		K-1450	
C5	50			D6-500	GP1K-500	UC-545		K-1450	
C6	50			D6-500	GP1K-500	UC-545		K-1450	
C7	2000								
C8	2000								Note 1
C9	8.5								
C10	80								
C11	.27								
C12	2000			DD-202	801-002	UC-522		C-1220	
C13	2000			DD-202	801-002	UC-522		C-1220	
C14	2000			DD-202	801-002	UC-522		C-1220	
C15	2000			DD-202	801-002	UC-522		C-1220	
C16	2000			DD-202	801-002	UC-522		C-1220	
C17	2000			DD-202	801-002	UC-522		C-1220	
C18	2000			DD-202	801-002	UC-522		C-1220	
C19	6.8								
C20	100			DD-101	801-101	ZT-531		KR-1310	
C21	2000			DD-202	801-002	UC-522		C-1220	
C22	4000			D6-402	811-004	UC-5240			
C23	2000			DD-202	801-002	UC-522		C-1220	
C24	10000			DD-103	811-01	DC-511			
C25	4000			D6-402	811-004	UC-5240			
C26	4000			D6-402	811-004	UC-5240			Note 2
C27	2000			DD-202	801-002	UC-522		C-1220	

Note 1: Some versions may use a 7.5MMF capacitor (N150) in this application.
Note 2: Not used in some versions.

CONTROLS

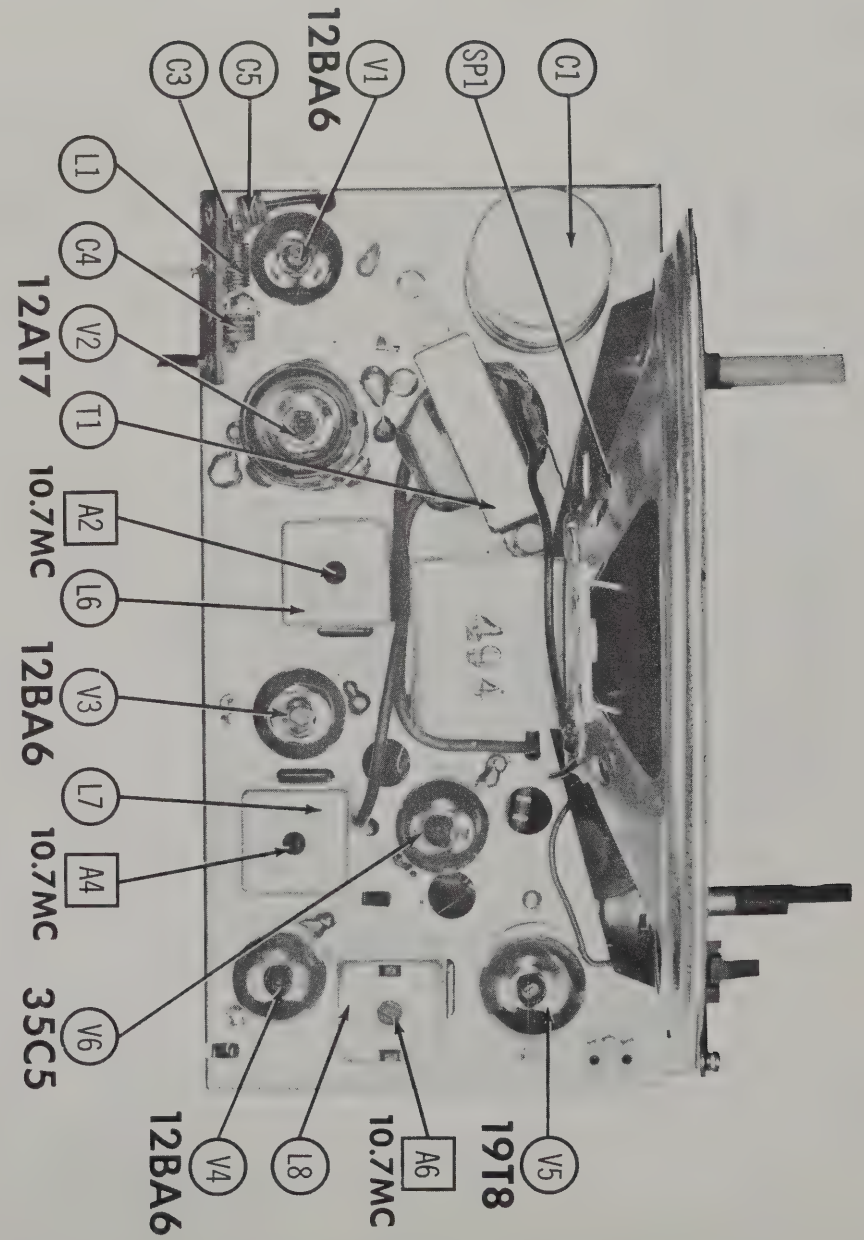
ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: GRANCO PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	AO-458A			AB-69		Volume
B	Shaft		Not Req.			AK-19		Attach to R1A
C	Switch		Not Req.			KB-1		Attach to R1A

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: GRANCO PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	470KΩ	½		BTS-470K	
R3	2200Ω	½		BTS-2200	
R4	10KΩ	½		BTS-10K	
R5	10Ω	½		BTS-10	
R6	330Ω	½		BTS-330	
R7	220KΩ	½		BTS-220K	
R8	330Ω	½		BTS-330	
R9	10Ω	½		BTS-10	
R10	100KΩ	½		BTS-100K	
R11	330Ω	½		BTS-330	
R12	10Ω	½		BTS-10	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: GRANCO PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R13	22KΩ	½		BTS-22K	
R14	1Meg	½		BTS-1Meg	
R15	33KΩ	½		BTS-33K	
R16	4.7Meg	½		BTS-4.7Meg	
R17	220KΩ	½		BTS-220K	
R18	470KΩ	½		BTS-470K	
R19	150Ω	½		BTS-150	
R20	10Ω	½		BTS-10	
R21	900Ω	4			
R22	22Ω	½		BTS-22	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	GRANCO PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.3KΩ	3.2Ω		Z1101	A-3025	A-3332	26S58 ①	S-12X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	GRANCO PART No.	QUAM PART No.	
SP1	4" X 6"	PM	3.2Ω			

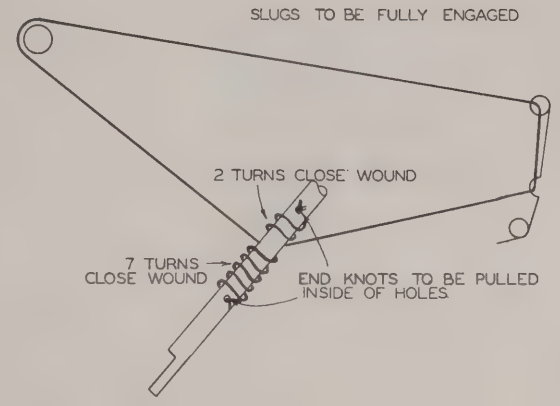
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	GRANCO PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	FM Ant. Coil	0Ω		AL-477				
L2	RF Choke	.2Ω		AL-141				
L3	FM RF Coil	0Ω		AL-455				
L4	FM Osc. Coil	0Ω		AL-456				
L5	Cathode Choke	.2Ω		AL-141				
L6	1st FM IF	.9Ω	.9Ω	CL472	16-3487	FM-254	1463	
L7	2nd FM IF	.9Ω	.9Ω	CL472	16-3487	FM-254	1463	
L8	Ratio Det.	1.5Ω	.8ΩCT	CL473	17-3488*	FM-255	1463	Tertiary winding = .4Ω

* Cut out chassis hole and drill mounting holes.

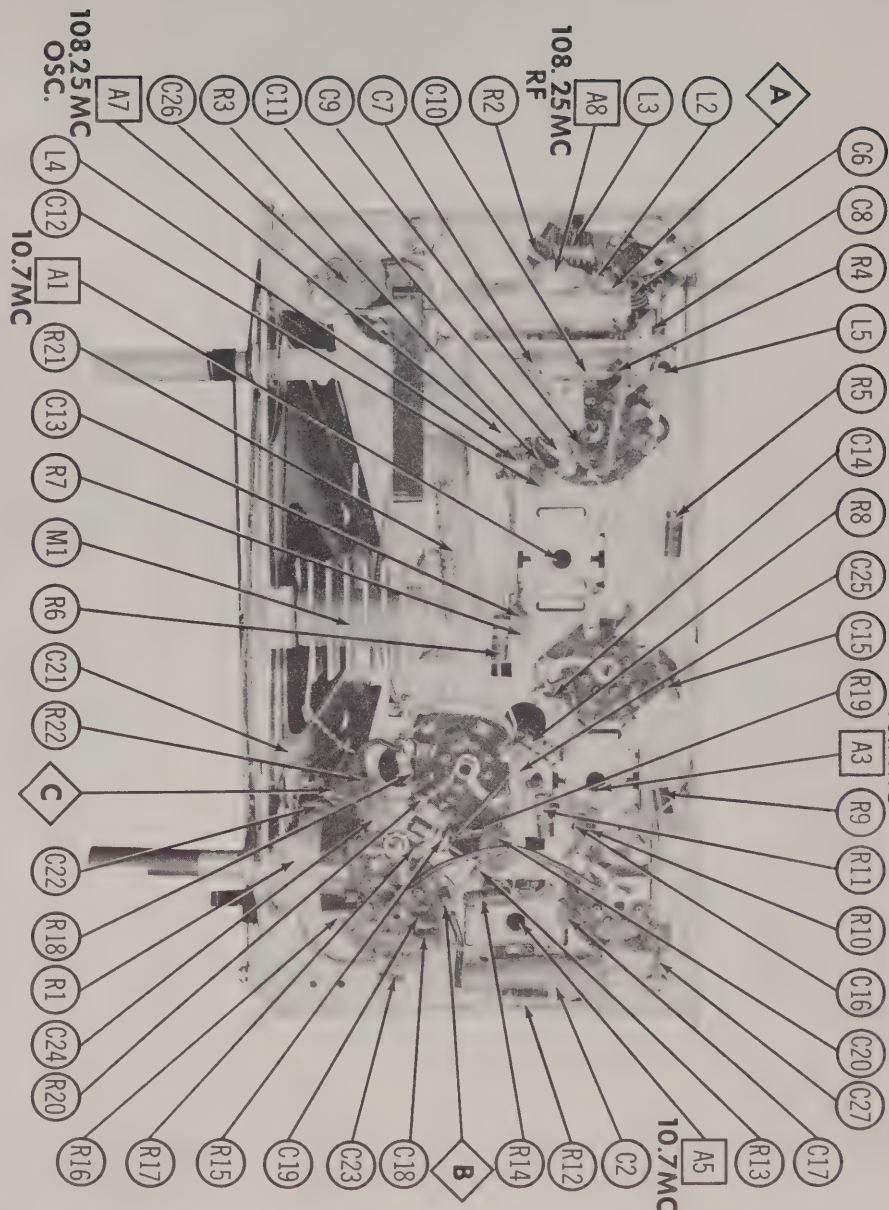
SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	GRANCO PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.095A		1101A	RS100A	6S100A	5M1	100A	



DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



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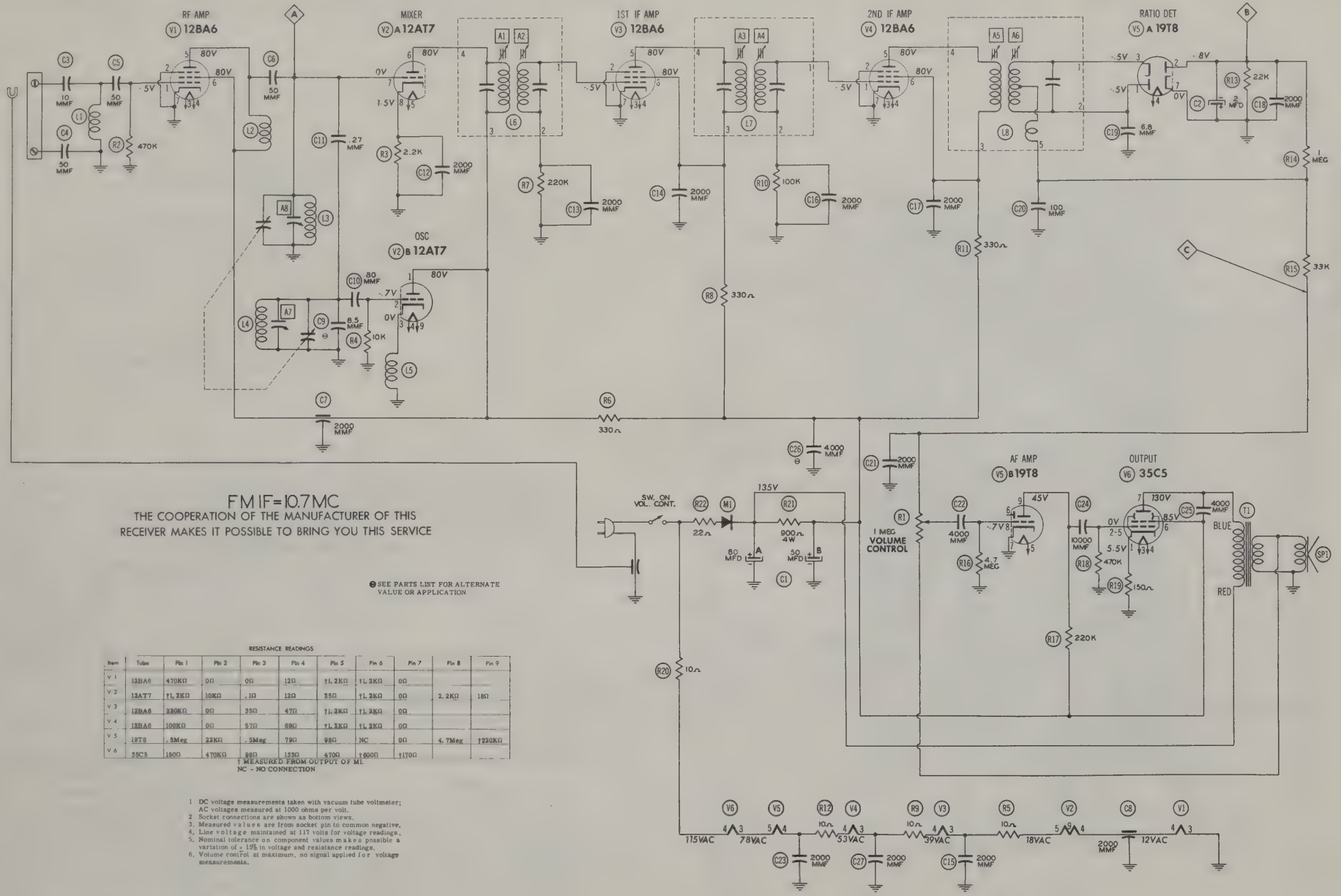

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12BA6	470KΩ	0Ω	0Ω	12Ω	†1.2KΩ	†1.2KΩ	0Ω		
V 2	12AT7	†1.2KΩ	10KΩ	.1Ω	12Ω	25Ω	†1.2KΩ	0Ω	2.2KΩ	18Ω
V 3	12BA6	220KΩ	0Ω	35Ω	47Ω	†1.2KΩ	†1.2KΩ	0Ω		
V 4	12BA6	100KΩ	0Ω	57Ω	69Ω	†1.2KΩ	†1.2KΩ	0Ω		
V 5	19T8	.5Meg	22KΩ	.5Meg	79Ω	98Ω	NC	0Ω	4.7Meg	†220KΩ
V 6	35C5	150Ω	470KΩ	98Ω	133Ω	470Ω	†600Ω	†170Ω		

† MEASURED FROM OUTPUT OF M1
NC - NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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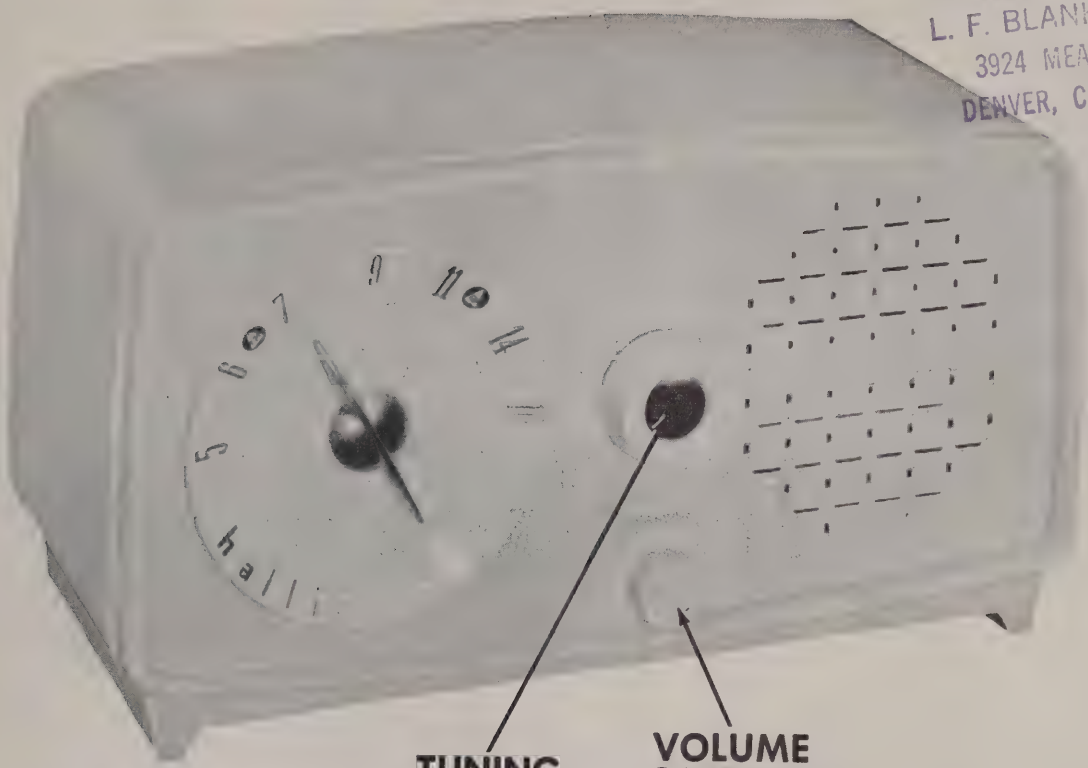
HALLICRAFTERS
MODELS 5R60, 5R61



HALLICRAFTERS
MODELS 5R60, 5R61

TRADE NAME	Hallicrafters Models 5R60, 5R61
MANUFACTURER	Hallicrafters Co., 4401 W. Fifth Ave., Chicago 24, Ill.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-120 Volts AC-DC
RATING	.24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~ Mod)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1400KC	1400KC	"	A5, A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	600KC	600KC	"		If necessary, bend outside plates of oscillator rotor.

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PARTS LIST AND DESCRIPTIONS

HALLICRAFTERS
MODEL 5R60

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: Hallicrafters PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det-AVC-AF Amp.	12AV6	12AV6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: Hallicrafters PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	70	150	121-985			TCD498	TDL-8030-150	FMT-315	
B	30	150							
C2	.05	400	46AW503J	DF-503		PT415	IMP4-S5	330415	
C3A	220								
B	2000								
C	5000		♦121-987	♦PC-150	♦1408-01				
D	250								
E									
C4	.01	600	46ZA103J		811-01	PT611	IMP6-S1	330611	
C5	.047	400	46BR473L4			PT4147	IMP4-S47	3304147	
C6	.05	400	46AW503J			PT415	IMP4-S5	330415	

♦ Items C3A, C3B, C3C, C3D, C3E, R5A, R5B and R5C are combined in one unit.
When replacing items separately, items C3D and C3E should total 250MMF.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: Hallicrafters PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	121-199	A13-133	A47-500K-Z	AB-60	U-48	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: Hallicrafters PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	22KΩ	½	23X20X223K	BTS-22K	
R3	180Ω	½		BTS-180	Note 1
R4	3.3Meg	½	23X20X335K	BTS-3.3Meg	
R5A	6.8Meg	½		BTS-6.8Meg	
B	470KΩ	½	♦121-987	BTS-470K	
C	470KΩ	½		BTS-470K	

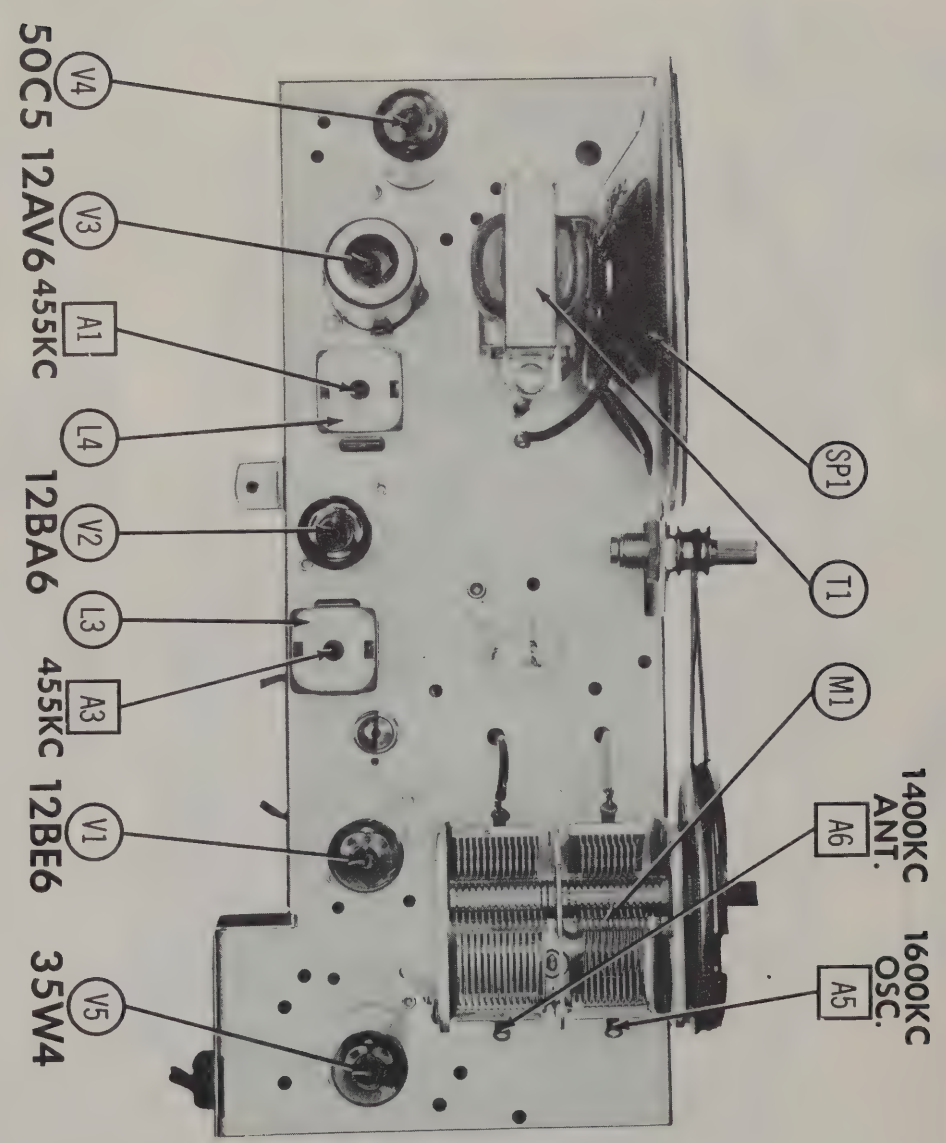
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: Hallicrafters PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R6	120Ω	½	23X20X121K	BTS-120	Note 2
R7	1500Ω	1	23X30X152K	BTA-1500	
R8	22Ω	½	23X20X220K	BTS-22	

♦ Items R5A, R5B, R5C, C3A, C3B, C3C, C3D and C3E are combined in one unit.
Note 1: Some versions use a 220Ω resistor in this application.
Note 2: Some versions use a 150Ω resistor in this application.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: Hallicrafters PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2.3KΩ	3.4Ω	Part of spkr.	Z1101	A-3025	A-3332	26S58 ①	S-12X	① Drill one new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Hallicrafters PART No.	QUAM PART No.	
SP1	4"	PM	3.4Ω	121-997	4A07 ①	① Cut off corner for mounting clearance.

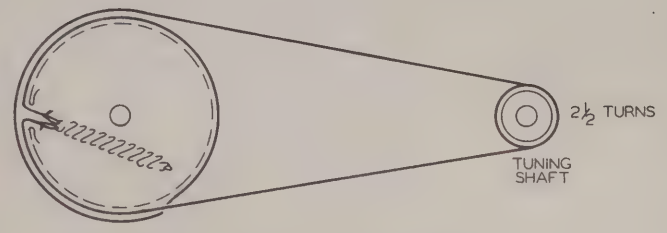
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Hallicrafters PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	2.8Ω		121-966				Includes cabinet back.
L2	Osc. Coil	.5Ω	5.5Ω	121-983	14-1073*		69-Osc. ■	
L3	Input IF	17Ω	17Ω	121-998	16-6758	BC-352	12-C1	
L4	Output IF	17Ω	17Ω	121-998	16-6758	BC-353	12-C2	

* Leads sufficient mounting support.
■ Drill new mounting hole.

MISCELLANEOUS

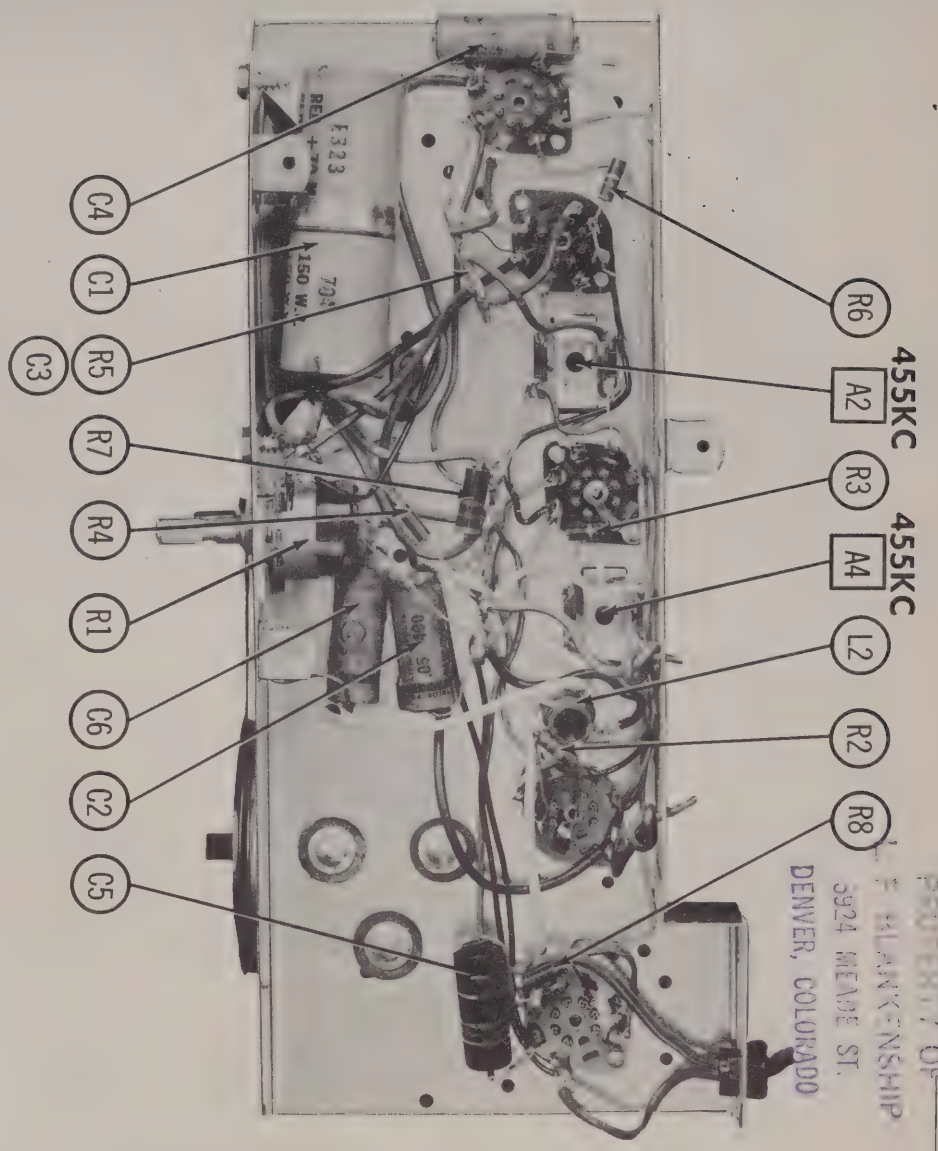
ITEM No.	PART NAME	Hallicrafters PART No.	NOTES
M1	Tuning Cap.	121-984	2 Gang (28-475MMF; 25-190MMF)
	Cabinet	121-981	Model 5R60
	Cabinet	121-982	Model 5R61
	Knob	121-992	Tuning - Model 5R60
	Knob	121-993	Tuning - Model 5R61
	Knob	121-994	On-Off-Volume - Model 5R60
	Knob	121-995	On-Off-Volume - Model 5R61
	Dial Pointer	121-989	



TUNING GANG FULLY CLOSED

DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



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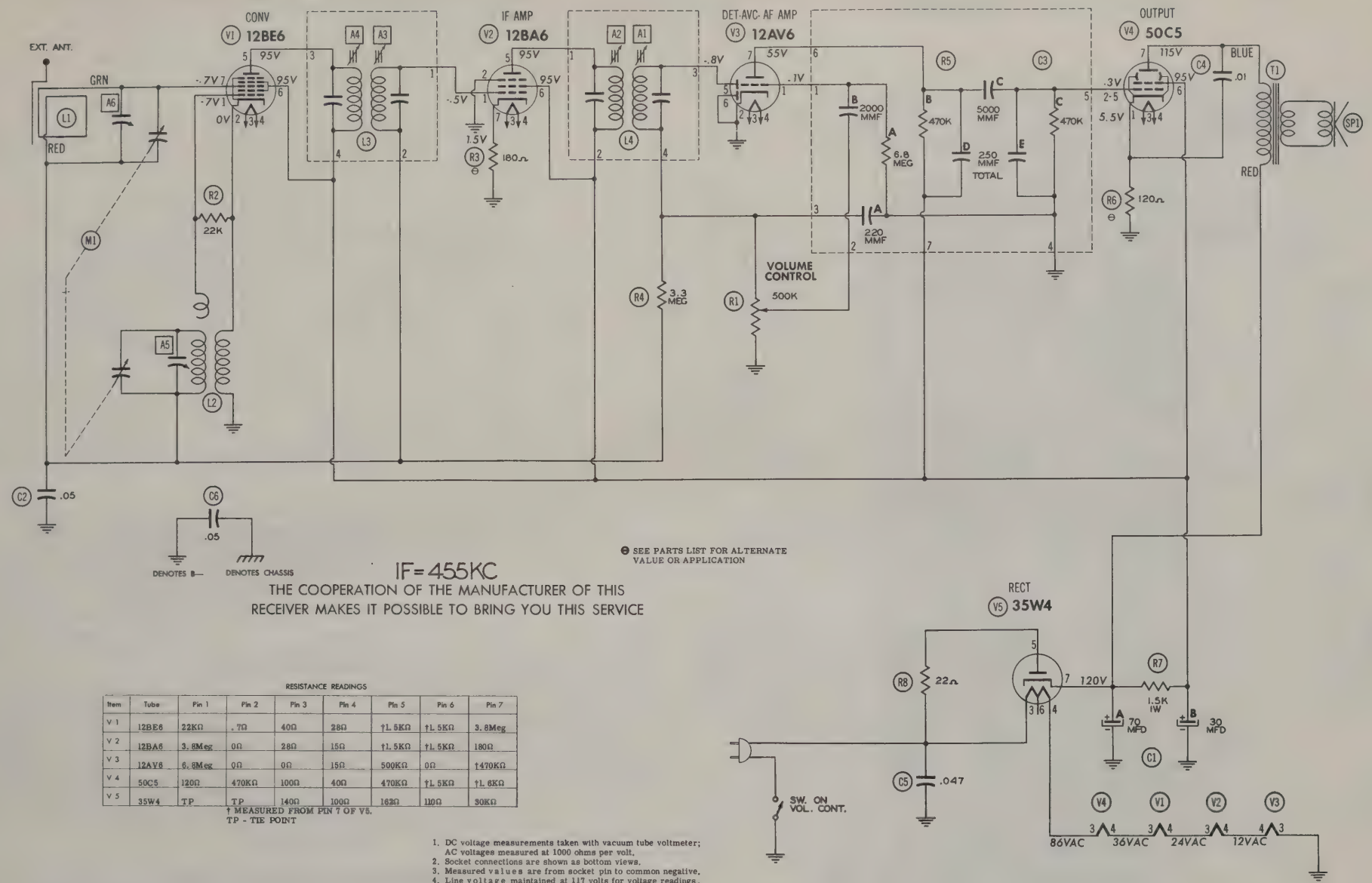
HALLICRAFTERS MODEL 5R60



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.7Ω	40Ω	28Ω	†1.5KΩ	†1.5KΩ	3.8Meg
V 2	12BA6	3.8Meg	0Ω	28Ω	15Ω	†1.5KΩ	†1.5KΩ	180Ω
V 3	12AV6	6.8Meg	0Ω	0Ω	15Ω	500KΩ	0Ω	†470KΩ
V 4	50C5	120Ω	470KΩ	100Ω	40Ω	470KΩ	†1.5KΩ	†1.6KΩ
V 5	35W4	TP	TP	140Ω	100Ω	162Ω	110Ω	30KΩ

† MEASURED FROM PIN 7 OF V5.
TP - TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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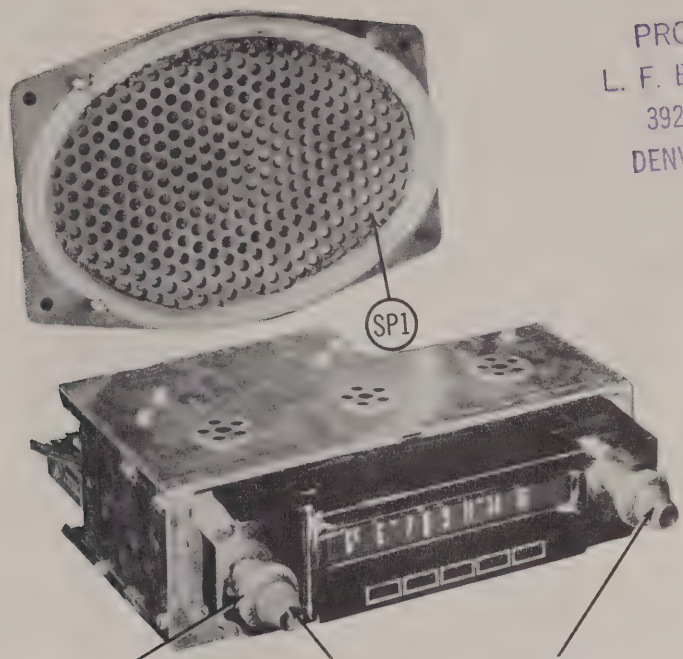
MOPAR
MODELS 613, 614



MOPAR
MODELS 613, 614

TRADE NAME	Mopar Model 613 (For 1955 Plymouths P26, P27), 614 (For 1955 Dodges D55, D56)
MANUFACTURER	Motorola, Inc., 4545 Augusta Blvd., Chicago 51, Ill.
TYPE SET	Battery Operated Custom Built AM Superheterodyne Automobile Receiver
TUBES (Six)	Types 6BA6 RF Amp., 6BE6 Conv., 6BA6 IF Amp., 6AV6 Det.-AVC-AF Amp., 6AQ5 Output, 6X4 Rectifier
POWER SUPPLY	6 Volt Storage Battery — RATING 5.9 Amp. @ 6.3 Volts DC
TUNING RANGE—BROADCAST	540KC-1610KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting. Set tone control to high.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (V2). Low side to chassis.	455KC (400~Mod)	Extreme high freq. end of dial	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	Fig. 1	Thru dummy to ant. receptacle	1610KC	"	"	A5, A6, A7	Adjust "
3.	"	"	1400KC	Back core carriage 13/64" from end stop.	"	A8, A9, A10	Adjust for maximum output (use alignment tool part #66A76278). Repeat steps 2 and 3. Cement cores.
4.				Weak station near 1400KC.			With receiver installed in car and antenna fully extended adjust A7 for maximum volume.

* Remove escutcheon to expose tuner core screws. Back tuner out completely before proceeding with step 2.

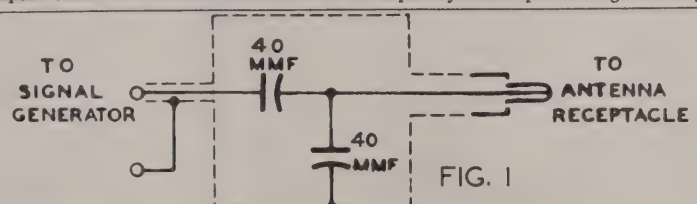


FIG. 1

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PARTS LIST AND DESCRIPTIONS

MOPAR MODEL 613

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amplifier	6BA6	6BA6	7BK	
V4	Det.-AVC-AF Amp	6AV6	6AV6	7BT	
V5	Audio Output	6AQ5	6AQ5	7BZ	
V6	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.
C1A	■15	350	23A485677			FP328	TM-3026	T-455
B	▲10	350						
C	20	25						
C2	22		21R120539					
C3	.006	400	8R121001			PT626	IMP6-D6	330626
C4	.05	200	8R121005	DF-503		PT415	IMP2-S5	330215
C5	.05	400	8R121567	DF-503		PT415	IMP4-S5	330415
C6	.005	400	8R121787	D6-502	811-005	PT625	IMP6-D5	330425
C7	.005	400	8R121787	D6-502	811-005	PT625	IMP6-D5	330425
C8	.03	400	8R121574			PT413	IMP4-S3	330613
C9	470		8R410121	D6-471	GP2K-471	UC-5347		K-1347
C10	.003	600	8R121569	D6-302	811-003	PT623	IMP6-D3	330623
C11	.02	1000	8R121004			PT1612	CT10-S2	
C12	.5	100	8R121666			PT405	IMP2-P5	330205
C13	.5	100	8R121666			PT405	IMP2-P5	330205

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	18B532519	*QJ-653A		F1-55	UF16L	Tone - Panel - Note
B	250KΩ	½				R2-35	UR254A	Volume - Rear
C	Switch					KB-4	US-26	Attach to R1B

Note. Model 613 will use an alternate control part #18K532909.

* CONCENTRIKIT EQUIVALENT : K-2 KIT, BASE ELEMENTS & SHAFTS : B11-137 & P12-204 (Panel) B13-130 & R1-220 (Rear) 76-1 SWITCH

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	NOTES
R2	470KΩ	½	6R6032	BTS-470K	
R3	220Ω	½	6R6270	BTS-220	
R4	22KΩ	½	6R6028	BTS-22K	
R5	33KΩ	½	6R6012	BTS-33K	
R6	390Ω	½	6R5554	BTS-390	
R7	12KΩ	1	6R533221	BTA-12K	
R8	1Meg	½	6R6004	BTS-1Meg	

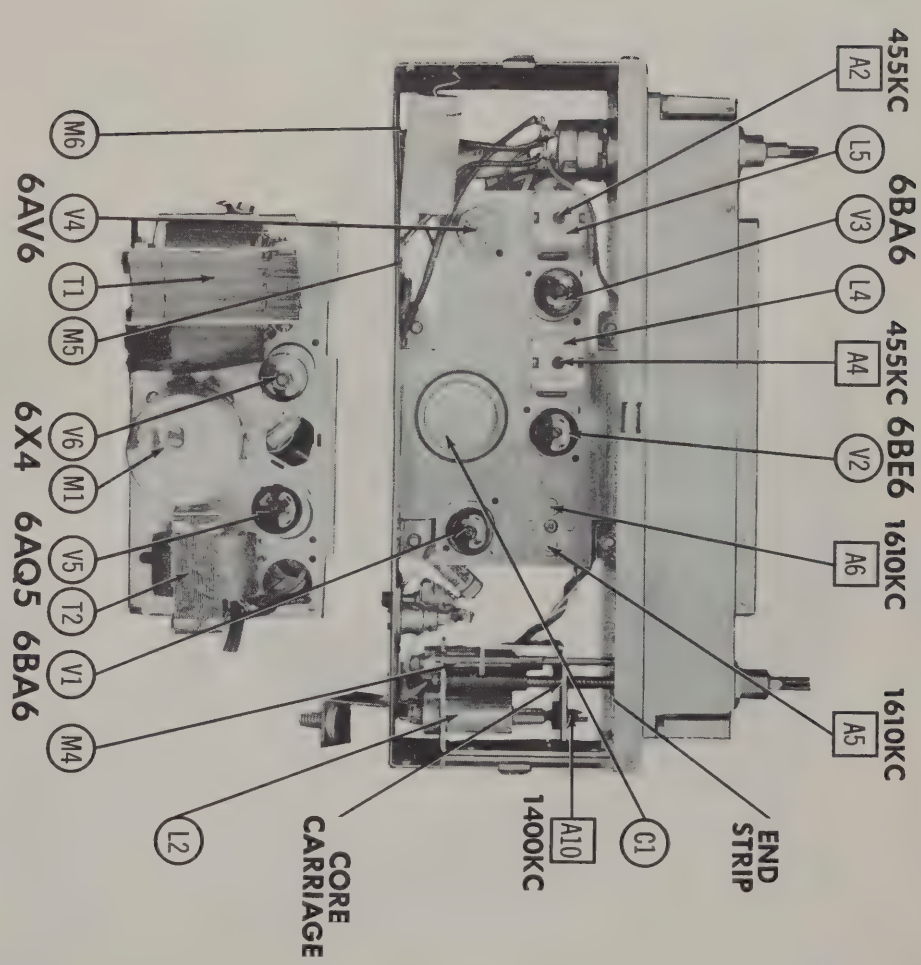
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	NOTES
R9	10Meg	½	6R2109	BTS-10Meg	
R10	1Meg	½	6R6004	BTS-1Meg	
R11	220KΩ	½	6R6015	BTS-220K	
R12	270Ω	1	6R6336	BTA-270	
R13	2200Ω	½	6A533220	BTA-2200	
R14	68Ω	½	6R6007	BTS-68	
R15	68Ω	½	6R6007	BTS-68	

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	6.3VCT ②3.6A	486VCT .031A			25C532631-A 25C532631 ①					

① Alternate power transformer.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	6KΩ	3.4Ω	25B532839	Z1113 ①	A-2930 ①	A-3877 ①	24S51 ①	S-3X ①	① Fabricate mounting.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA MOTOROLA PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	6" x 9"	PM	3.4Ω	50C533194	69A2	① Alternate speaker
	7"	PM	3.4Ω	50C533218 ①	7A21	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Coil	11.5Ω		24B533934				Iron core part #76B533938
L2	RF Coil	11.5Ω		24B533936				Iron core part #76B533938
L3	Osc. Coil	.5Ω	2.1Ω	24B533937				Iron core part #76B533938
L4	Input IF	16Ω	16Ω	24C485553	16-6758	BC-352	12-C1	
L5	Output IF	17Ω	17Ω	24K485554	16-6770	BC-355	12-C6	
L6	Vib. Hash Choke	0Ω		24A532093				18 Microhenries

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA MOTOROLA PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	NOTES
M1	Interrupter	6.3V	115∿	48B3333	5342	903M	5342	

FUSES

ITEM No.	TYPE	RATING	MOTOROLA PART No. FUSE	MOTOROLA PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M2	SFE	14A 32V	65X12894	9K533466	307014 (SFE14)	155014	SFE14	HRI

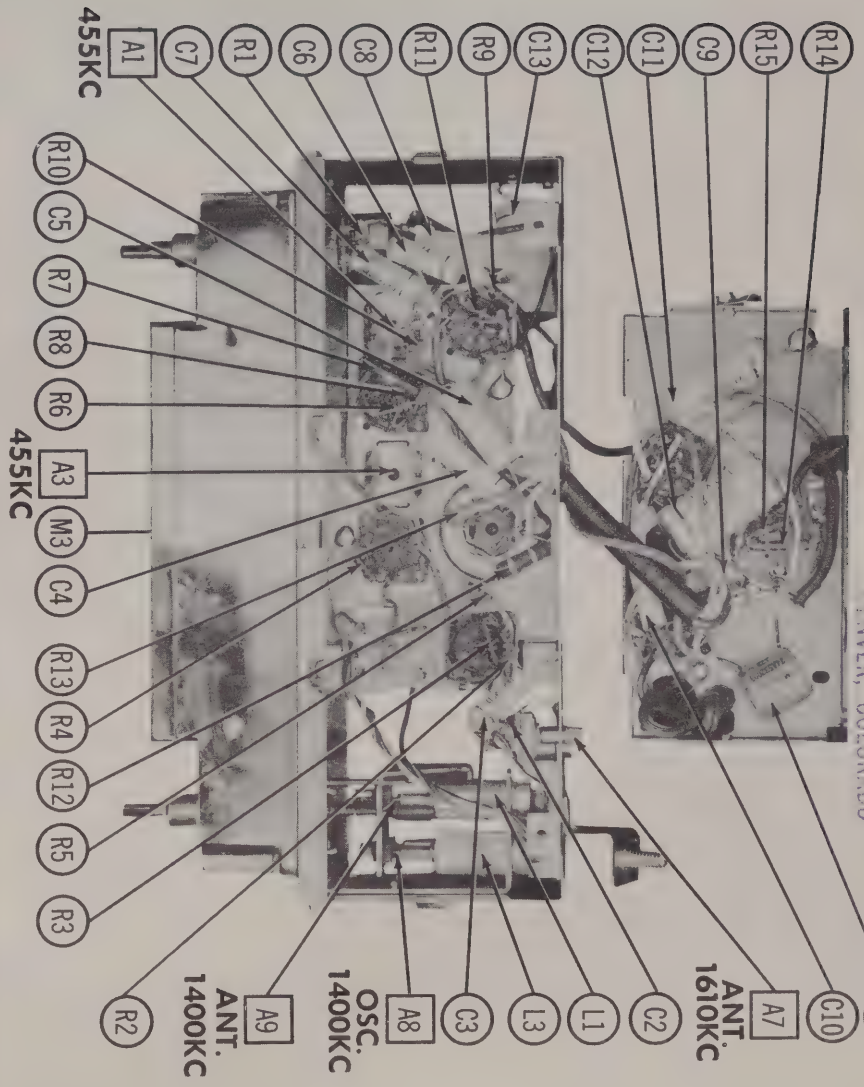
MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M3	Dial Light	65X11854	#47, Model 614
	Dial Light	65X12855	#55, Model 613
M4	Tuner	77D533235	Complete, Model 613
		77K533236	Complete, Model 614
M5	Spark Plate	64K532087	
M6	Spark Plate	64K532087	
A5,A6	Trimmer Cap.	20B532668	Dual (Osc. trimmer 420-490MMF) & (RF trimmer 7.5-75MMF) unit also consists of 4.7MMF fixed capacity and 47MMF fixed capacity
A7	Trimmer Cap.	20B532806	Ant. (50-240MMF)
	Knob	36B533005	Tone - Model 613
	Knob	36B532949	Tone - Model 614
	Knob	1V533308	On-off-volume & tuning - Model 613
	Knob	1V533109	On-off-volume & tuning - Model 614
	Crystal	61K532894	Model 613
	Crystal	61K532893	Model 614
	Pointer & Slider Assy.	1K532802	Model 613
	Pointer & Slider Assy.	1K532655	Model 614
	Dial Scale	34C533018	Model 613
	Dial Scale	34C532679	Model 614

SET 283 FOLDER 8

MOPAR MODEL 613

CHASSIS—BOTTOM VIEW



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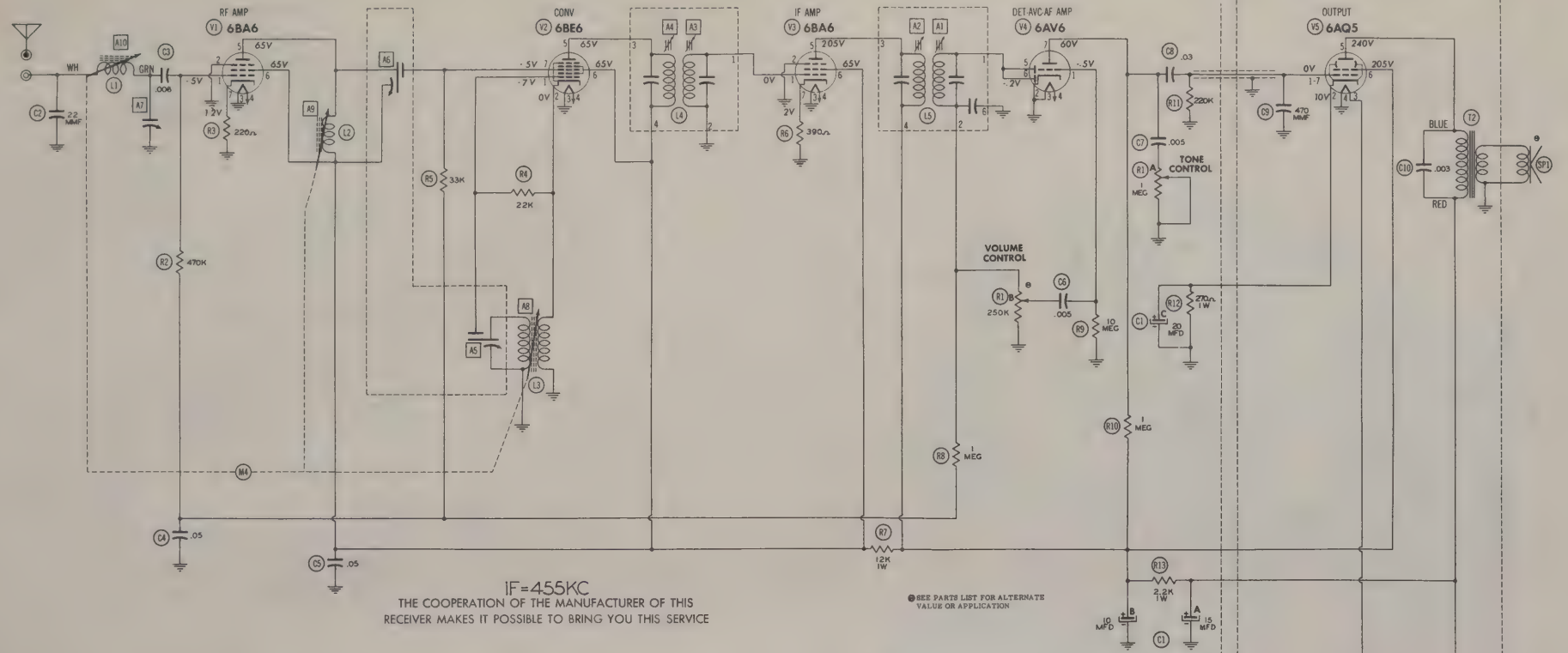
MOPAR MODEL 613



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	6BA6	1.7Meg	0Ω	0Ω	.1Ω	†14.2KΩ	†14.2KΩ	220Ω
V 2	6BE6	22KΩ	.1Ω	0Ω	.1Ω	†14.2KΩ	†14.2KΩ	1.2Meg
V 3	6BA6	20Ω	0Ω	0Ω	.1Ω	†2.2KΩ	†14.2KΩ	390Ω
V 4	6AV6	10Meg	0Ω	0Ω	.1Ω	250KΩ	250KΩ	†1Meg
V 5	6AQ5	220KΩ	270Ω	.1Ω	0Ω	†700Ω	†2.2KΩ	220KΩ
V 6	6X4	400Ω	NC	.1Ω	0Ω	NC	400Ω	150KΩ

† MEASURED FROM PIN 7 OF V6
NC - NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 6.3 volts for voltage readings.
5. Nominal tolerance on components values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

MOTOROLA MODELS 19CK1, B, 19CK2, B, 19CT1, B (Ch. TS-902A-03, -04 & Ch. BP-902A-01), Y19CK1, B, Y19CK2, B, Y19CT1, B (Ch. TS-902AY-03, -04, & Ch. BP-902A-01)

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MODEL 19CT1

MOTOROLA MODELS 19CK1, B, 19CK2, B, 19CT1, B (Ch. TS-902A-03, -04 & Ch. BP-902A-01), Y19CK1, B, Y19CK2, B, Y19CT1, B (Ch. TS-902AY-03, -04, & Ch. BP-902A-01)

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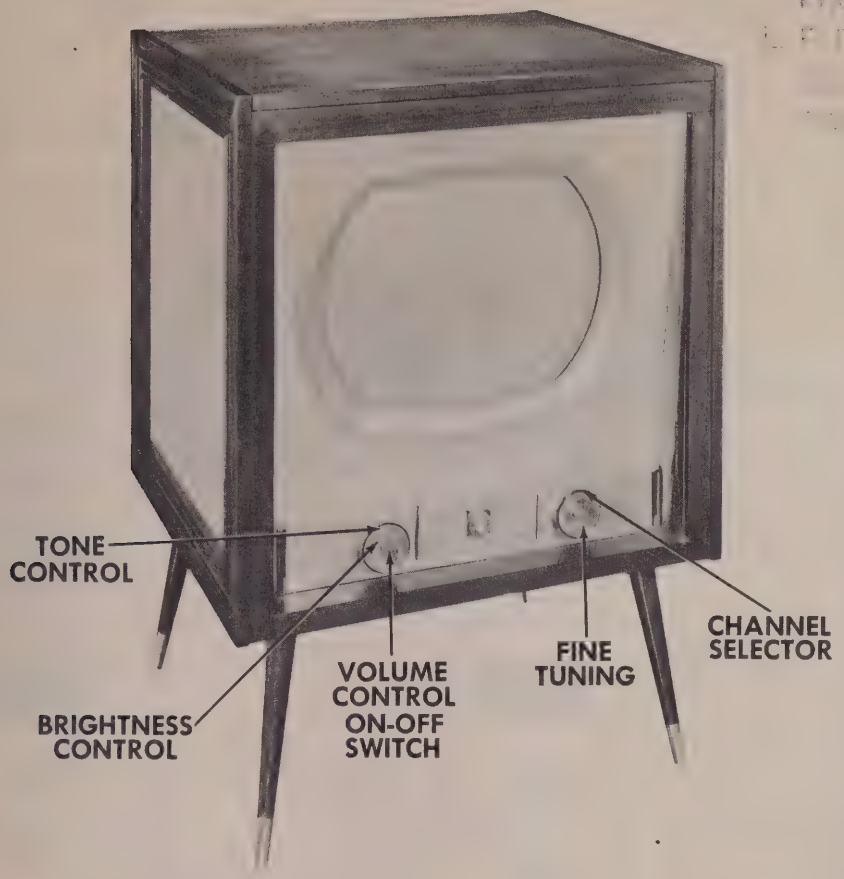
DATE 7–55 SET 283 FOLDER 9

PHOTOFACT* Folder

*TRADE MARK

MOTOROLA MODELS 19CK1, B, 19CK2, B, 19CT1, B (Ch. TS-902A-03, -04 & Ch. BP-902A-01), Y19CK1, B, Y19CK2, B, Y19CT1, B (Ch. TS-902AY-03, -04, & Ch. BP-902A-01)



MOTOROLA MODEL 19CT1 (Ch. TS-902A-04 & BP-902A-01)

TRADE NAME	Motorola	MODELS	CHASSIS
		19CK1, B, 19CK2, B, 19CT1, B.....	TS-902A-03 or -04 & BP-902A-01
		Y19CK1, B, Y19CK2, B, Y19CT1, B	TS-902AY-03 or -04 & BP-902A-01
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago, Ill.		
TYPE SET	Color Television Receiver		
TUBES	Thirty-one		
POWER SUPPLY	110-120 Volts AC - 60 Cycles	RATING	3 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

INDEX

Alignment Instructions ..... 5 thru 8
Block Diagram 3
Disassembly Instructions 10
Miscellaneous Adjustments 20,29
Parts List and Descriptions ..... 23 thru 27
Photographs
- Cabinet-Rear View 19
- Capacitor Identification (Main Chassis) 13, 16
- Capacitor & Alignment Ident. (Vertical Chassis).... 21
- Chassis-Bottom View (Main Chassis) 9
- Chassis-Top View (Main Chassis) 31, 32
- Chassis-Top View (Vertical Chassis) 27

Photographs (Con't)
- Picture Tube Assembly 29
- RF Tuner 4
- Resistor Identification (Main Chassis) R1-R100 ..14, 15
- Resistor Identification (Main Chassis)R101-R156. .12, 17
- Resistor & Inductor Ident. (Vert. Chassis) 28

Resistance Measurements 10
Schematic (Tuner) 30
Schematic (TV) 2
Tube Placement Chart (Bottom View) 11
Tube Placement Chart (Top View) 18

MOTOROLA MODELS 19CK1, B, 19CK2, B, 19CT1, B (Ch. TS-902A-03, -04 & Ch. BP-902A-01), Y19CK1, B, Y19CK2, B, Y19CT1, B (Ch. TS-902AY-03, -04, & Ch. BP-902A-01)

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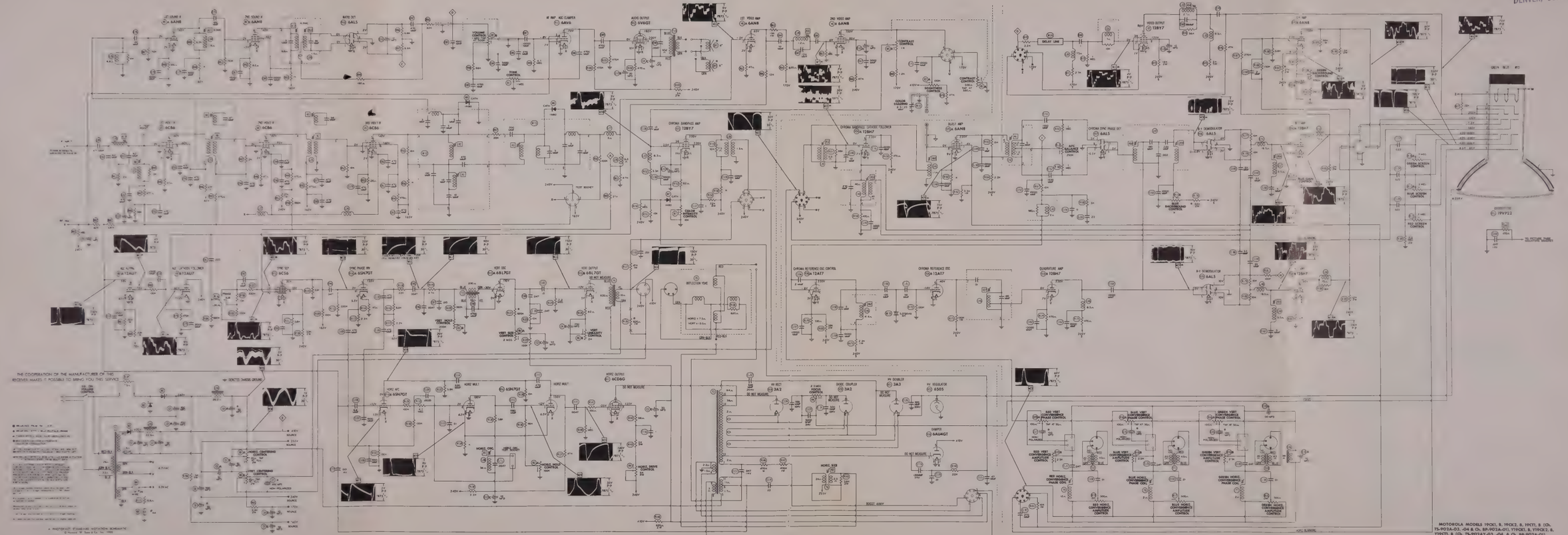

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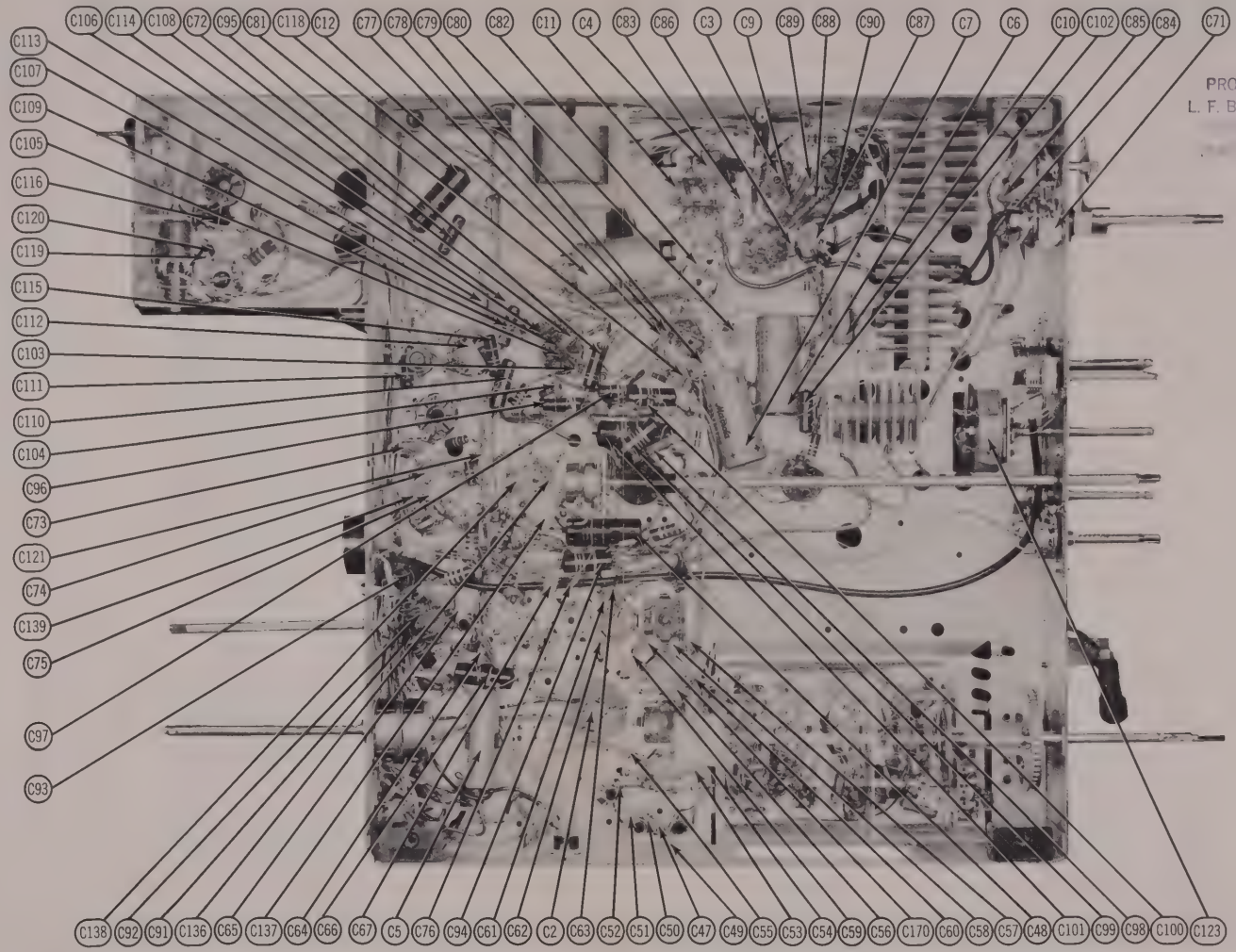

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CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

MOTOROLA MODELS 19CW1, B & 19CX1, B (CH. TS-902A-02, -04 & CH. BP-902A-01); Y19CK1, B, Y19CK2, B, Y19CT1, B (CH. TS-902AY-02, -04 & CH. BP-902A-01)

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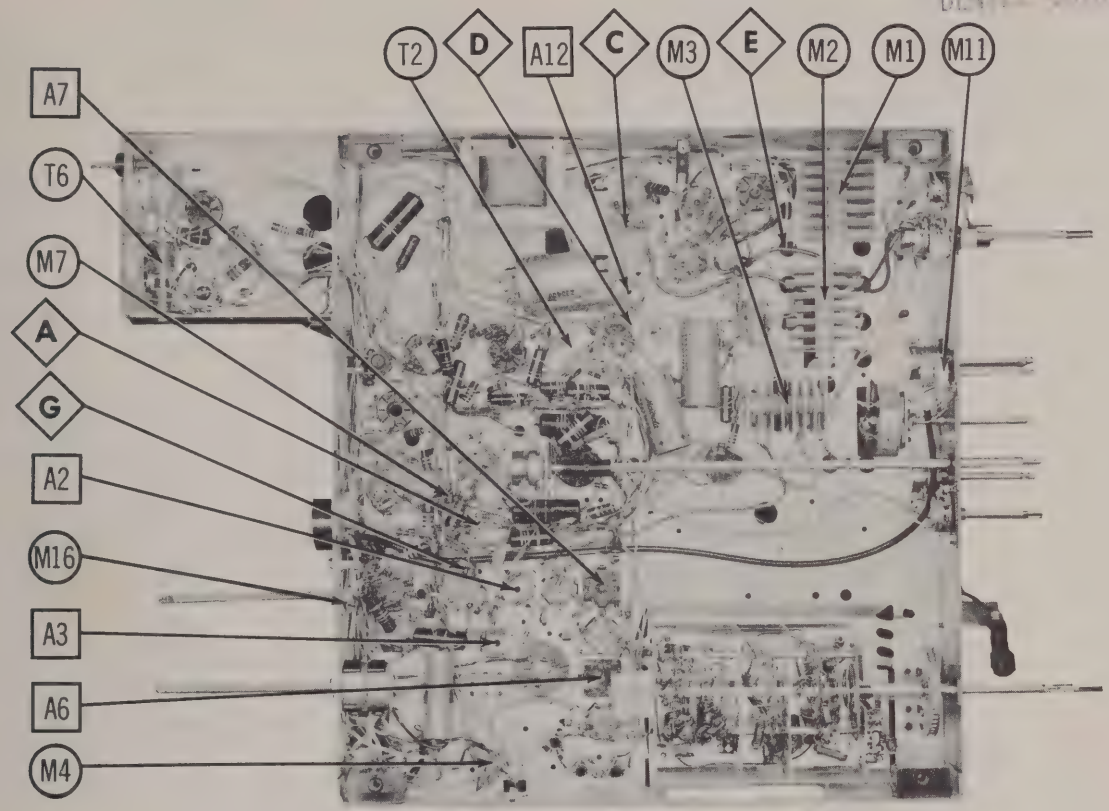
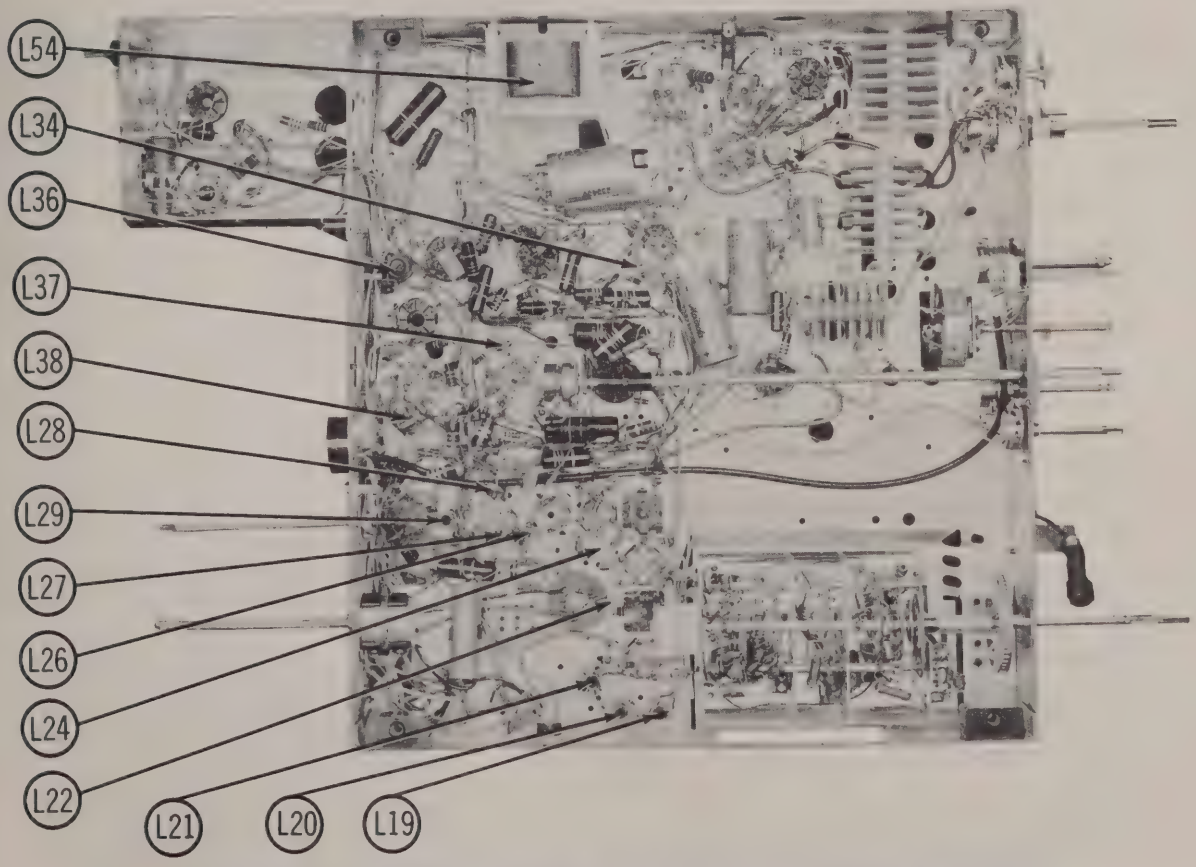
DEALER SERVICE



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



CHASSIS BOTTOM VIEW INDUCTOR IDENTIFICATION

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	†1.9KΩ	†400KΩ	INF	0Ω	.1Ω	INF	400KΩ	0Ω	0Ω
V 2	6U8	†14KΩ	400KΩ	†270KΩ	0Ω	.1Ω	†16KΩ	0Ω	0Ω	15KΩ
V 3	6CB6	40KΩ	47Ω	0Ω	.1Ω	†2KΩ	†2KΩ	0Ω		
V 4	6CB6	40KΩ	47Ω	0Ω	.1Ω	†2KΩ	†27KΩ	0Ω		
V 5	6CB6	0Ω	120Ω	0Ω	.1Ω	†2.5KΩ	†2KΩ	0Ω		
V 6	6AN8	†19KΩ	4.7KΩ	47Ω	.1Ω	0Ω	†4.3KΩ	†47KΩ	1Meg	0Ω
V 7	12BY7	40Ω	1Meg	40Ω	.1Ω	.1Ω	0Ω	†5KΩ	†18KΩ	40Ω
V 8	12AU7	†65Ω	†30KΩ	470KΩ	0Ω	0Ω	300KΩ	550KΩ	†13KΩ	.1Ω
V 9	6AN8	†2.5KΩ	150KΩ	100Ω	.1Ω	0Ω	†2.5KΩ	†2.5KΩ	150KΩ	82Ω
V 10	6AL5	1Meg	1Meg	0Ω	.1Ω	6.8KΩ	0Ω	6.8KΩ		
V 11	6AV6	4.7Meg	0Ω	.1Ω	0Ω	350KΩ	350KΩ	†470KΩ		
V 12	6V6GT	TP	.1Ω	†2.2KΩ	†1.5KΩ	470KΩ	TP	0Ω	470Ω	
V 13	6CS6	32KΩ	0Ω	.1Ω	0Ω	†25KΩ	†8.5KΩ	1Meg		
V 14	6SN7GT	300KΩ	3.9KΩ	100KΩ	220KΩ	†11KΩ	2.2KΩ	.3Ω	0Ω	
V 15	6BL7GT	2.2Meg	■1.7KΩ	220Ω	500KΩ	■1.5Meg	53Ω	0Ω	.1Ω	
V 16	6SN7GT	140KΩ	†50KΩ	1KΩ	5Meg	†9KΩ	1KΩ	.1Ω	0Ω	
V 17	6CD6G	NC	.1Ω	0Ω	NC	1Meg	NC	0Ω	†7.5KΩ	Top Cap ▲12Ω
V 18	6AU4GT	TP	NC	4Meg	NC	■25Ω	TP	.1Ω	0Ω	
V 19	3A2		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			Top Cap ▲50Ω
V 20	3A2		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			Top Cap INF
V 21	3A3		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			Top Cap INF
V 22	6505			CATHODE	----	0Ω				Top Cap INF
V 23	12BY7	4.4KΩ	13KΩ	4.4KΩ	0Ω	0Ω	.1Ω	†1KΩ	†22KΩ	4.4KΩ
V 24	12BH7	†550Ω	.4Ω	470Ω	0Ω	0Ω	†550Ω	6.3Ω	500Ω	.1Ω
V 25	6AN8	†12KΩ	5KΩ	600Ω-1KΩ	0Ω	.1Ω	†2.2KΩ	2.5KΩ	1.1Ω	1KΩ
V 26	12AT7	†2.2KΩ	INF	330Ω	0Ω	0Ω	†150KΩ	150KΩ	0Ω	.1Ω
V 27	6AL5	INF	INF	0Ω	.1Ω	.4Ω	0Ω	.4Ω		
V 28	6AL5	INF	INF	.1Ω	0Ω	8Ω-1KΩ	0Ω	8Ω-1KΩ		
V 29	6AL5	INF	INF	.1Ω	0Ω	.7Ω	0Ω	.7Ω		
V 30	12BH7	†12KΩ	INF	0Ω-1KΩ	.1Ω	.1Ω	†12KΩ	INF	1.2KΩ	0Ω
V 31	19VP22	■120KΩ	†12KΩ	▲800KΩ - 1.8Meg	■100KΩ	■100KΩ	†15KΩ	▲800KΩ - 1.8Meg	NC	INF
		Pin 11 ▲800KΩ - 1.8Meg		Pin 12 †12KΩ	Pin 13 ■100KΩ	Pin 14 ■120KΩ				

† MEASURED FROM OUTPUT OF M1.
■ MEASURED FROM OUTPUT OF M3.
▲ MEASURED FROM PIN 3 OF V18.
TP - TIE POINT
NC - NO CONNECTION

DISASSEMBLY INSTRUCTIONS

CABINET TOP REMOVAL

1. Remove 10 metal screws from rear cover. Remove cover.
2. Remove 1 wood screw. (Located on rear underside of cabinet top.)
3. Slide wood slat toward rear of set. Top may now be opened.

REMOVAL OF CHASSIS FROM CABINET

1. Remove 5 push-on type control knobs from front panel of cabinet.
2. Remove 3 push-on type control knobs from under front control door.
3. Remove 2 wood screws from antenna bracket.
4. Remove 1 wood screw from grounding strap. (Chassis to mask.)
5. Disconnect 2 speaker leads.
6. Remove 4 chassis mounting board bolts.
7. Remove chassis and mounting board.

REMOVAL OF CHASSIS FROM MOUNTING BOARD

1. Disconnect HV lead, picture tube socket and vert. deflection yoke socket from chassis. Remove 3 convergence magnet sockets.
2. Remove 1 metal screw from HV cage cover. Remove cover.
3. Remove 1 metal screw from grounding lead. (Tube mount to HV cage.)
4. Disconnect 2 horiz. deflection yoke leads.
5. Remove 4 chassis bolts. Remove chassis from mounting board.

REMOVAL OF VERTICAL CHASSIS FROM MAIN CHASSIS

1. Remove 4 plugs from horizontal chassis.
2. Remove 1 plug from picture tube socket.
3. Remove 4 metal screws from vert. chassis.
4. Remove vert. chassis.

SPEAKER REMOVAL

1. Remove 8 speaker nuts.
2. Remove 2 speakers.

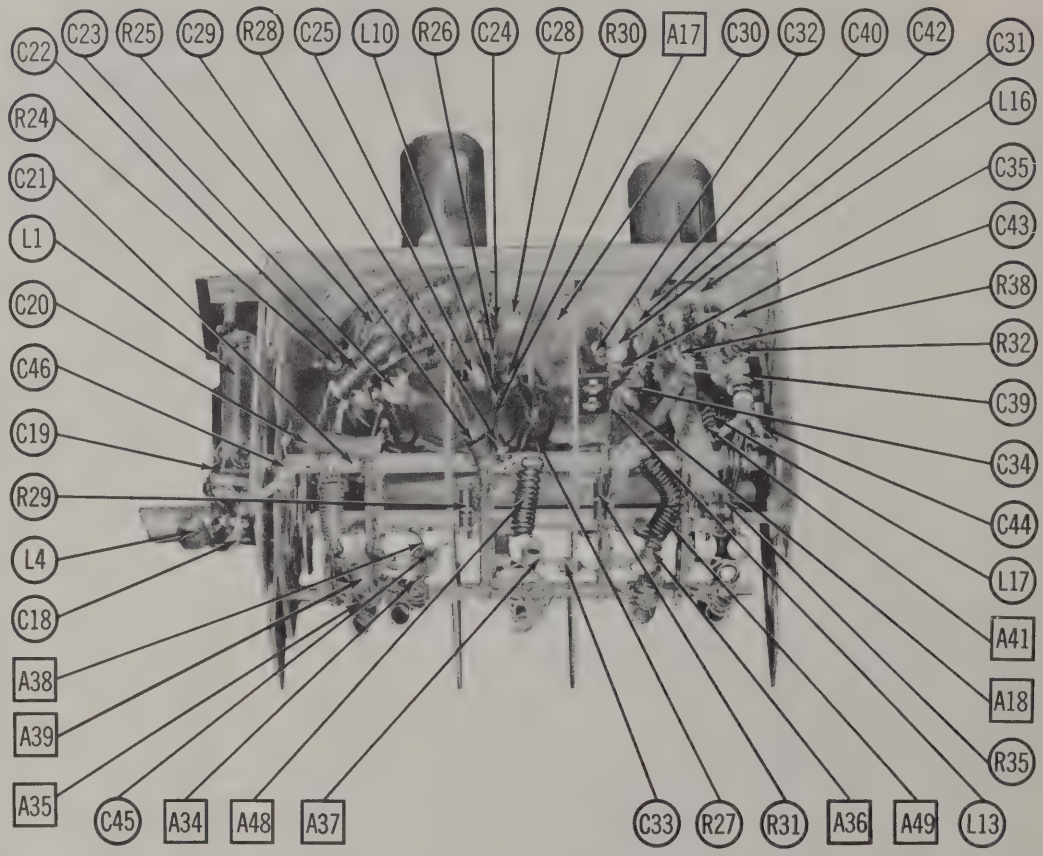
PICTURE TUBE REMOVAL

1. Remove chassis from cabinet.
2. Disconnect HV lead and picture tube socket.
3. Pull lever (located above magnets on yoke ass'y.) to the left (from rear of set). This will lock in position, removing pressure of magnets from tube.
4. Remove 2 magnet assemblys from neck of picture tube.
5. Remove 2 front tube mounting band bolts.
6. Remove picture tube from mounting.

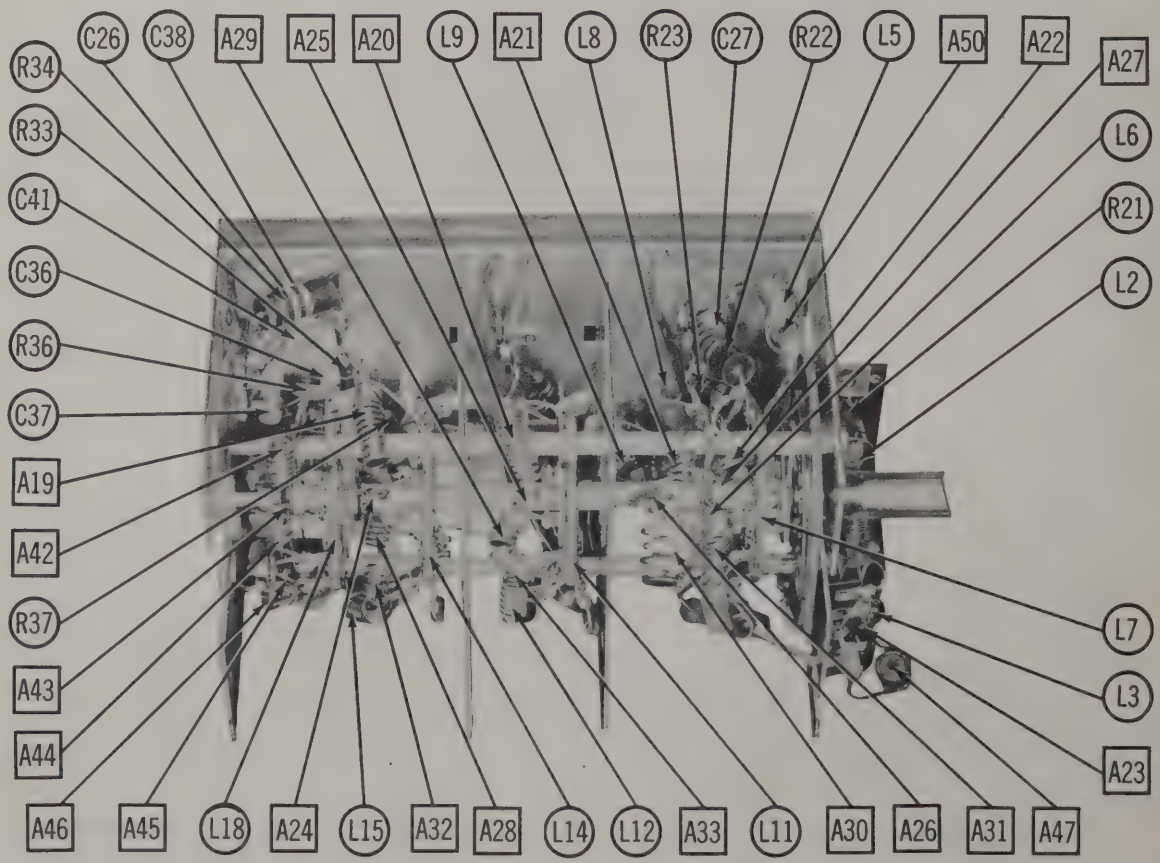
PROPERTY OF
L. F. BI[illegible]KER SHIP
3324 MEADE ST.
DENVER, COLORADO

BLOCK DIAGRAM

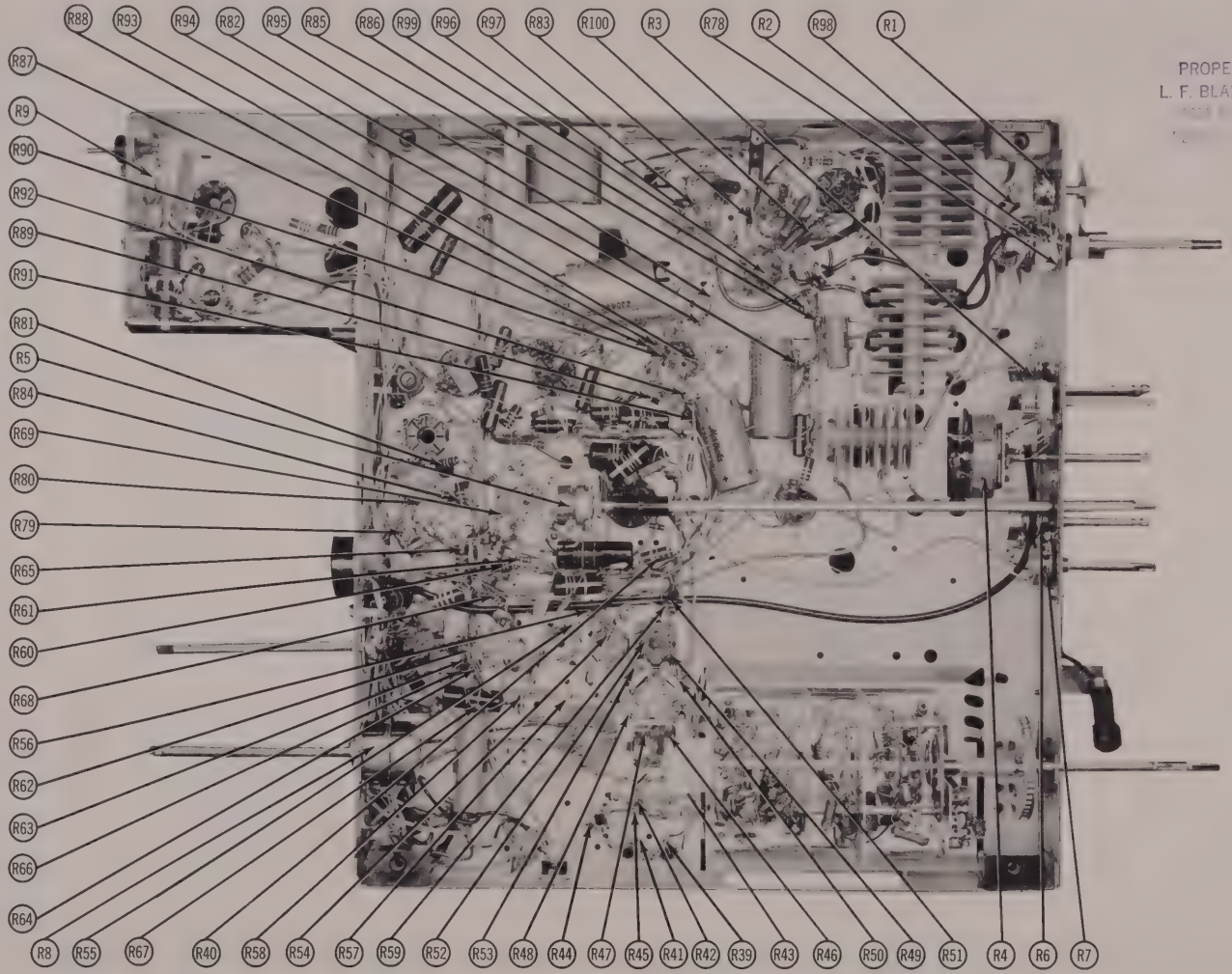
MOTOROLA MODELS 19CK1, B, 19CK2, B, 19CT1, B
(Ch. TS-902A-03, -04 & Ch. BP-902A-01), Y19CK1, B,
Y19CK2, B, Y19CT1, B (Ch. TS-902AY-03, -04 & Ch. BP-902A-01)



RF TUNER-RIGHT SIDE

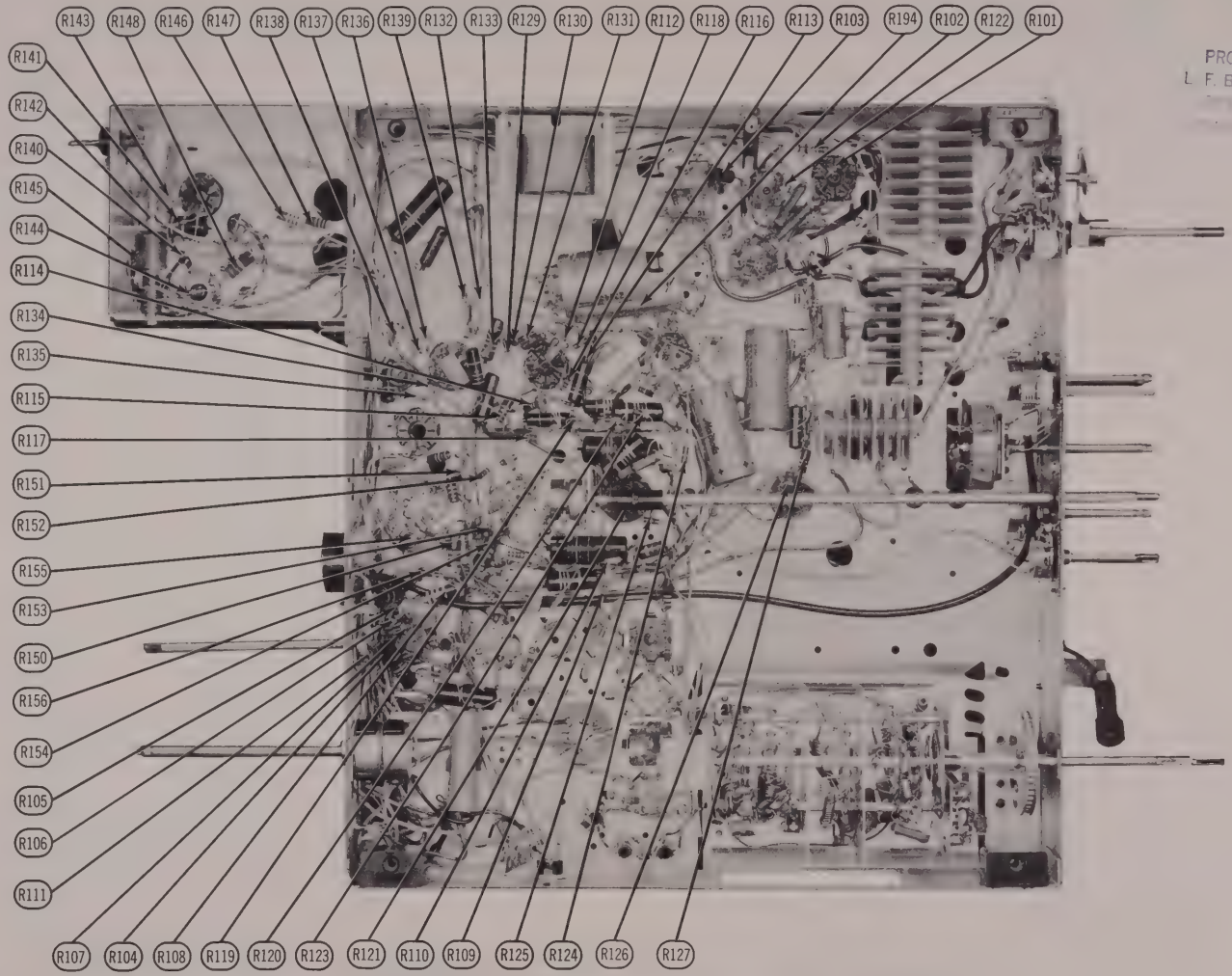


RF TUNER-LEFT SIDE



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION (R1–R100)

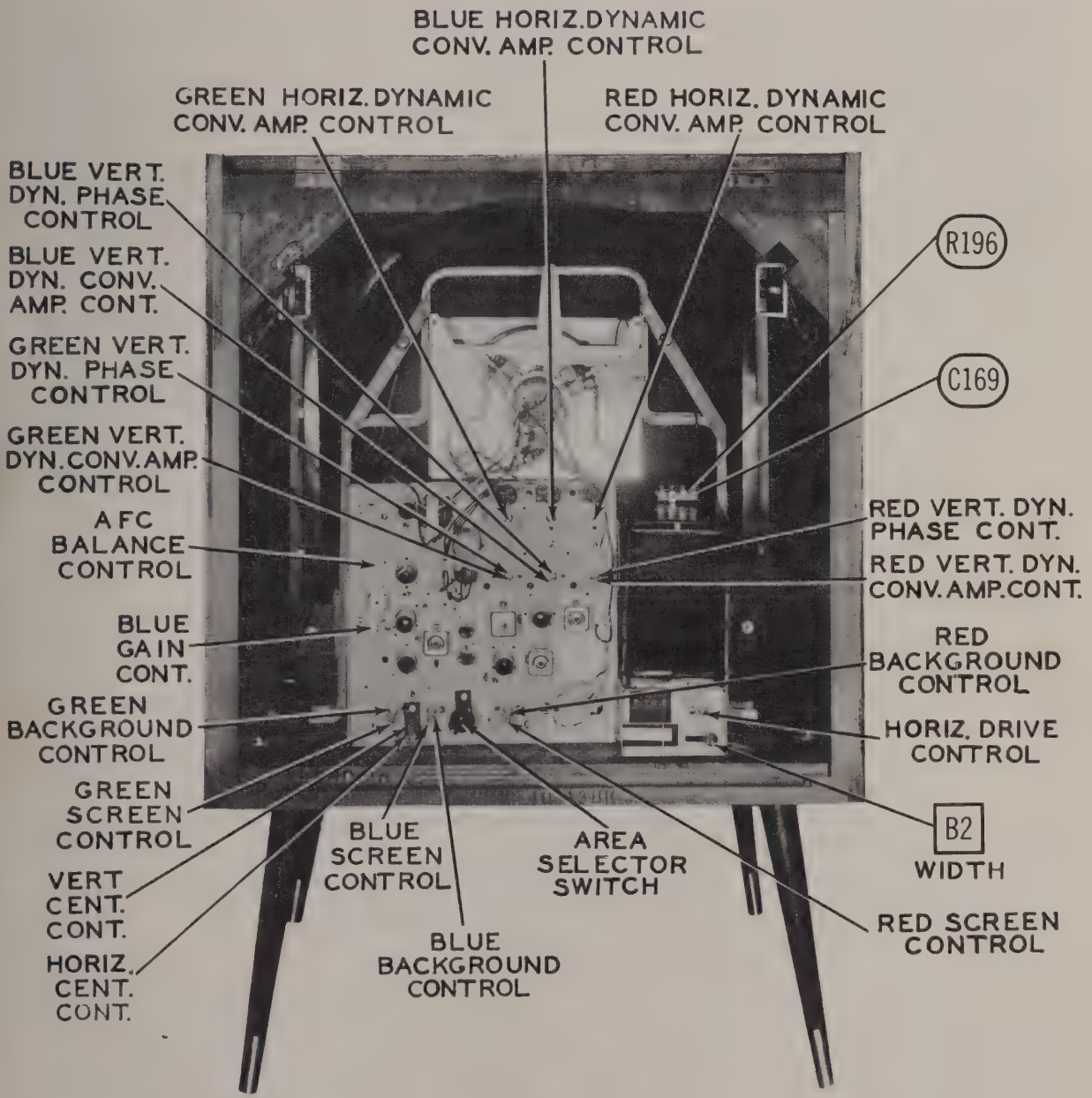
MOTOROLA MODELS 19CK1, B, 19CK2, B, 19CT1, B
(Ch. TS-902A-03, -04 & Ch. BP-902A-01), Y19CK1, B,
Y19CK2, B, Y19CT1, B (Ch. 15-902A1-03, -04 & Ch. BP-902A-01)



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION (R101-R156)

MOTOROLA MODELS 19CK1, B, 19CK2, B, 19CT1, B (Ch. TS-902A-03, -04 & Ch. BP-902A-01); 19CK1, B, Y19CK2, B, Y19CT1, B (Ch. TS-902AY-03, -04 & Ch. BP-902A-01)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
[illegible], COLORADO



CABINET-REAR VIEW

MOTOROLA MODELS 19CK1, B, 19CK2, B, 19CT1, B (Ch. TS-902A-03, -04 & Ch. BP-902A-01); Y19CK1, B, Y19CK2, B, Y19CT1, B (Ch. TS-902AY-03, -04 & Ch. BP-902A-01)

MISCELLANEOUS ADJUSTMENTS

PURITY ADJUSTMENT

Connect the signal from a dot pattern generator across antenna terminals. Make certain the horizontal sweep circuit adjustments are correct. Adjust the 3 beam positioning magnets (located over the 3 guns in neck of picture tube) and the lateral corrector magnet (located around neck of tube) for convergence of the three beams (red, green and blue) at the center of the picture tube.

Remove any signal to the receiver and make the blue and green guns inoperative by shorting out their grids to chassis. Adjust the brightness control for a brighter than normal raster.

Loosen the four screws that hold the yoke cradle to allow movement of the yoke. If set has previously been adjusted for purity, a slight adjustment of yoke position should be sufficient.

Note position and location of the purity device, it consists of two magnetic rings between the blue corrector magnet and the dynamic convergence coils. Adjust to position the tabs of one ring opposite the tabs of the other ring until a minimum strength magnetic field is produced. When correct tabs of purity device are opposite each other, rotating both rings together should have no affect on the screen. If incorrect, position tabs on magnetic rings to place the tabs adjacent to each other. To check purity at the center of the screen, separate the tabs slightly to produce a weak magnetic field. Rotate the purity device to obtain best red purity in center of the screen. Continue adjusting the field strength and position of purity device tabs until the purity is best in center portion of the screen.

Move the yoke slightly backward or forward until best edge purity is obtained, then if necessary, readjust the purity device for best overall purity. Remove ground from blue grid and ground red grid to chassis. Check the purity of the blue field. Remove ground from green grid and ground blue grid. Check the purity of the green field. If necessary to obtain best overall purity of all the colors, compromise the settings of the purity device. Slightly favor the red field when adjusting for overall purity. Remove ground from grids of green, blue or red guns.

DYNAMIC CONVERGENCE SYSTEM ADJUSTMENT

Turn the horizontal and vertical dynamic amplitude controls (R15A, R17A, R19A, R16B, R18B & R20B) fully clockwise.

Turn the vertical dynamic phase controls (R16A, R18A & R20A) to their mid-range position.

Position the shift lever so that the convergence coil pole pieces are positioned on the neck of picture tube. Connect a signal from a dot generator across antenna terminals and adjust the brightness of each beam so that each color dot is easily observed using the background (R10B & R11B) and screen (R10A, R11A & R12A) controls.

Adjust the three beam positioning magnets and the blue lateral magnet for best convergence at center of screen. Ground the blue and green grids and check purity using the red field. If necessary, slightly readjust the yoke assembly. Remove the ground from blue and green gun grids.

VERTICAL DYNAMIC CONVERGENCE ADJUSTMENT

Using a dot pattern generator as a signal source, choose a vertical column of dots near the center of the screen. Notice that these dots are converged near the center of the screen and become over converged away from the center of the screen toward top and bottom.

Observe the position of the blue dot in each red, green and blue group along a vertical column of dots. Adjust the green and red vertical phase controls (R16A & R20A) until the red and green dots are converged and spaced symmetrically from the blue dots in each group. This is done to increase uniformity from middle of the screen to top and bottom. Adjust the blue vertical phase control (R18A) until blue dots in each group along a vertical line near center of the screen have the same relative position with respect to the green and red dots. If necessary, adjust the three beam positioning magnets for center convergence. Adjust the green vertical amplitude control (R16B) until position of the green dots are equally spaced from the blue dots from top to bottom. Then adjust the green beam positioning magnet (located over green gun in neck of tube) to reconverge the green dot with the blue at the center of the screen.

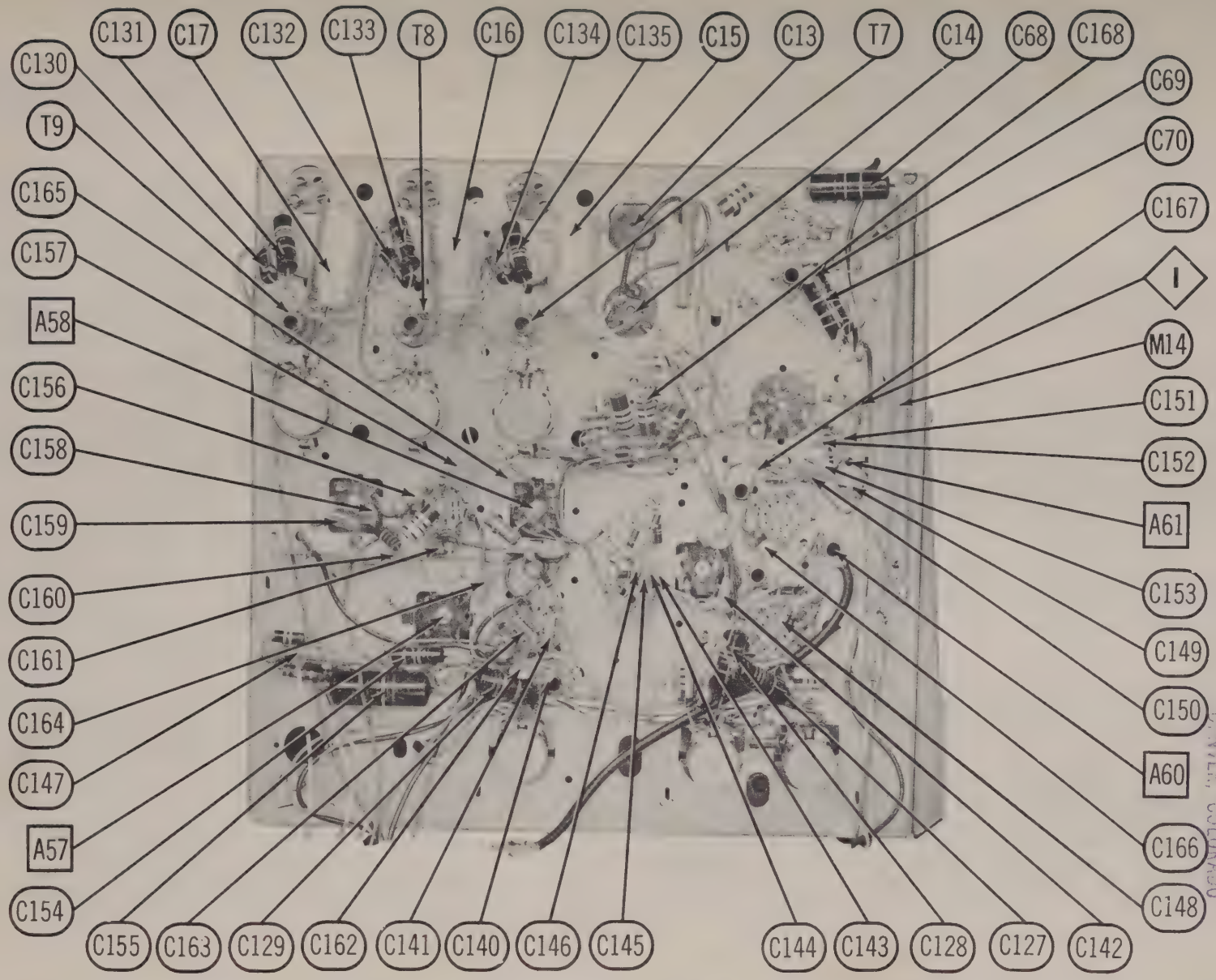
Adjust the red vertical amplitude control (R20B) until position of the red dots are equally spaced from the blue dots from top to bottom. Then adjust the red beam positioning magnet (over red gun) to reconverge the red dots with the blue at the center of the screen. Adjust the blue vertical amplitude control (R18B) until position of the blue dots are equally spaced from the green and red dots from top to bottom. Adjust the blue beam magnet (located over blue gun) for convergence of the vertical row of dots.

HORIZONTAL DYNAMIC CONVERGENCE ADJUSTMENT

Leave dot pattern generator connected as under "Vertical Dynamic Convergence Adjustment".

Turn the blue horizontal dynamic amplitude control (R17A) fully clockwise. Adjust the red and green horizontal dynamic amplitude controls (R19A & R15A) fully counter clockwise. Adjust the blue horizontal phase coil (T6) until the blue dot is displaced a maximum amount from the green and red dots near the center of the screen. Adjust R17A fully counter clockwise. Using same procedure as for adjustment of T8, adjust the green horizontal phase coil (T7) and the red horizontal phase coil (T9) as above. R19A and R15A controls remain fully counter clockwise during adjustment of T7 and T9. Select one horizontal row of dots near center of the screen. Adjust R17A and T8 together to obtain the same amount of misconvergence of the blue dots at the center and edges of the screen. This will establish a horizontal line across the screen which will be used as reference positions for positioning the red and green dots. Adjust the blue beam positioning magnet (located over blue gun) for convergence of the blue dots near middle of the screen. Adjust R15A and T7 to obtain uniform and symmetrical displacement of the green dots away from the blue dots in all horizontal dot groups. Adjust the green beam positioning magnet (located over green gun) for convergence of the green dots near center of the screen.

Adjust R19A and T9 to obtain uniform and symmetrical displacement of the red dots away from the blue dots in all horizontal dot groups. Adjust the red beam positioning magnet (located over red gun) for convergence of red dots near center of the screen. Check the purity and if necessary, adjust the blue lateral magnet and the three beam positioning magnets for best overall convergence.



VERTICAL CHASSIS BOTTOM VIEW CAPACITOR & ALIGNMENT IDENTIFICATION

PROPERTY OF
L. F. DYANKENSHIP
DENVER, COLORADO

MOTOROLA MODELS 19CK1, B, 19CK2, B, 19CT1, B
(Ch. TS-902A-03, -04 & Ch. BP-902A-01), 19CK1, B,
19CK2, B, 19CT1, B (Ch. TS-902AV-03, -04 & Ch. BP-902A-01)

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		MOTOROLA PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BZ7	6BZ7	9AJ	
V2	Osc.-Mixer	6U8	6U8	9E	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	1st. Video Amp.- 2nd. Video Amp.	6AN8	6AN8	9DA	
V7	Video Output	12BY7	12BY7	9BF	
V8	AGC Cathode Follower- AGC Keying	12AU7	12AU7	9A	
V9	1st. Sound IF Amp.- 2nd. Sound IF Amp.	6AN8	6AN8	9DA	
V10	Ratio Detector	6AL5	6AL5	6BT	
V11	AF Amp.- AGC Clamper	6AV6	6AV6	7BT	
V12	Audio Output	6V6GT	6V6GT	7S	
V13	Sync Separator	6CS6	6CS6	7CH	
V14	Sync Phase Inv.- Horiz. AFC	6SN7GT	6SN7GTA	8BD	
V15	Vert. Osc. - Vert. Output	6BL7GT	6BL7GT	8BD	
V16	Horiz. Mult.	6SN7GTA	6SN7GTA	8BD	
V17	Horiz. Output	6CD6G	6CD6G	5BT	
V18	Damper	6AU4GT	6AU4GT	4CG	
V19	HV Rectifier	3A2	3A2		
V20	Diode Coupler	3A2	3A2		
V21	HV Doubler	3A3	3A3	8EZ	
V22	HV Regulator	6505	6505		
V23	Chroma Bandpass Amplifier	12BY7	12BY7	9BF	
V24	Chroma Bandpass Cathode Follower- Quadrature Amp.	12BH7	12BH7	9A	
V25	Burst Amplifier- "G-Y"Amplifier	6AN8	6AN8	9DA	
V26	Chroma Reference Osc. Control - Chroma Reference Osc.	12AT7	12AT7	9A	
V27	Chroma Sync Phase Det.	6AL5	6AL5	6BT	
V28	"B-Y"Demodulator	6AL5	6AL5	6BT	
V29	"R-Y"Demodulator	6AL5	6AL5	6BT	
V30	"B-Y"Amplifier- "R-Y"Amplifier	12BH7	12BH7	9A	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	MOTOROLA PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V31	19VP22	19VP22					

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

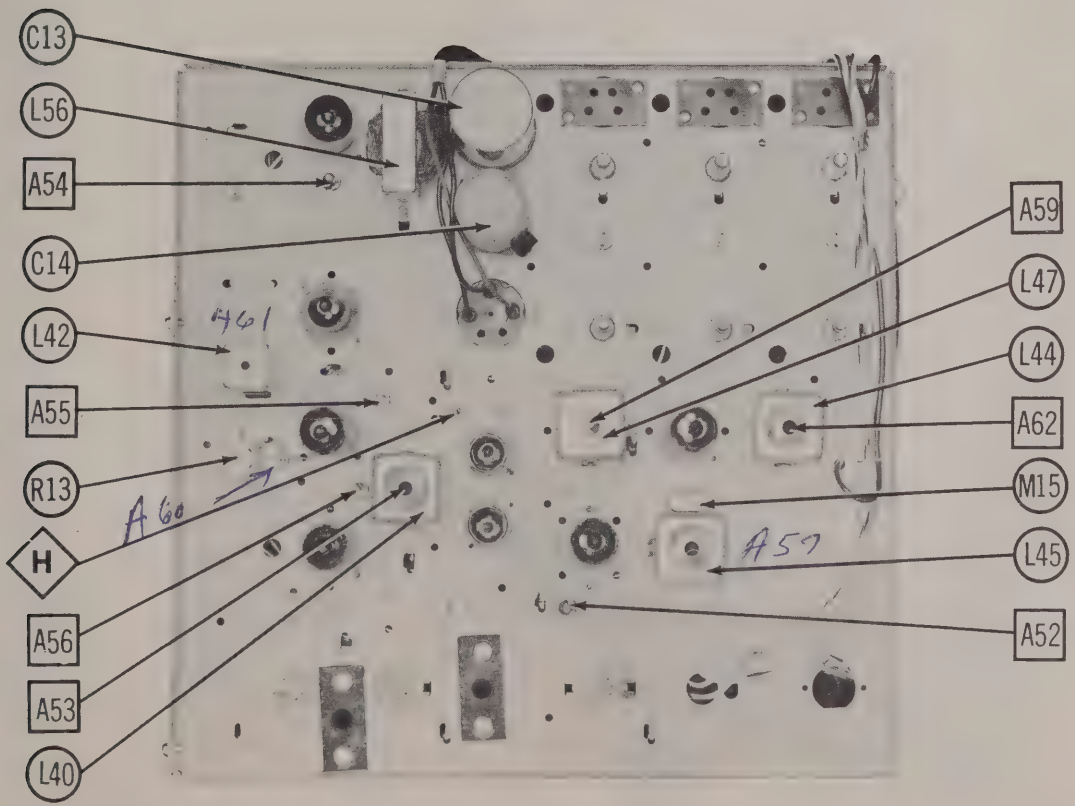
ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	MOTOROLA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲150	250	23B733207			FP217.7	TM-D150-250	S-160	
B	▲150	250						S-160	
C2	200	150	23B722771						
C3A	200	150	23B734515			FP420.44	TM-3065		
B	▲50	250					TD-200-150		
C	▲30	400							
D	■20	400							
C4A	▲150	300	23B721874			FP419.1	TM-4118	D-150	
B	▲10	250						T-405	
C	■20	300							
D	250	50							
C5A	50	50	23A734545			TCD49	TDL-D50-150	FMD-1550	
B	50	50							
C6	500	25	23K732636			TC2505	TD-500-25	MTH-2550	
C7	450	10	23A732739				TD-450-15NP		Note 2
C8	150	300							Note 3
C9	3	50	23A690543			TC30	TD-4-50	MMT-0505	
C10	3	50	23A690543			TC30	TD-4-50	MMT-0505	
C11	10	50	23A90205			TC32	TD-10-50	MT-0510	
C12A	■10	200	23B734516			FP465	TM-4060	Q-335	
B	20	25							
C	▲10	250							
D	▲100	25							
C13A	▲10	300	23B734486						
B	▲500	15							
C	■500	15							Note 4
C14A	▲70	25	23B734496						
B	■100	25							
C15	100	15	23K734273				TD-100-15NP	MTH-1525 *	Note 2
								MTH-1525	
C16	100	15	23K734273				TD-100-15NP	MTH-1525 *	Note 2
								MTH-1525	
C17	100	15	23K734273				TD-100-15NP	MTH-1525 *	Note 2
								MTH-1525	
C18	33		21R119912		N150L-330				
C19	27		21R119896		N150K-270				
C20	220		21R115905	D6-221	GP2K-221	UC-5322			
C21	4.7		21R115955	TCZ-4.7	NP0A-4R7	ZT-555			
C22	220		21R115905	D6-221	GP2K-221	UC-5322			
C23	1000		21R115386	DD-102	801-001	DC-521			
C24	1000		21R115386	DD-102	801-001	DC-521			
C25	1000		21R115386	DD-102	801-001	DC-521			
C26	1000		21R115386	DD-102	801-001	DC-521			

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

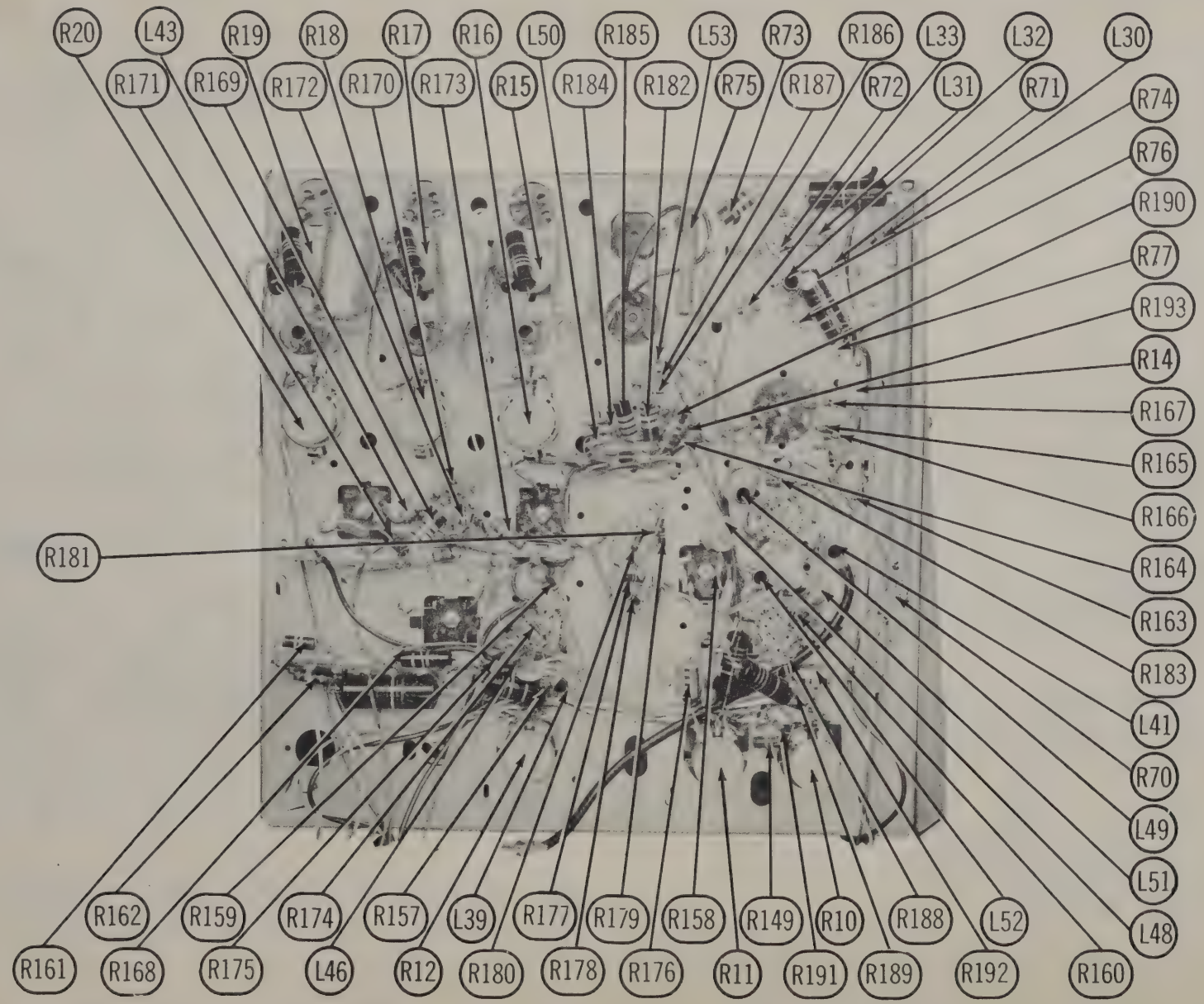
PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M8	Dial Light		#44, Bayonet
M9	Tuner	1U733177 (WTT-67)	VHF - Not used in all versions of models 19CK1, 19CK1B, 19CK2, 19CK2B, 19CT1 & 19CT1B.
	Tuner	1U733178 (WTT-67Y)	VHF - Used in some versions of models 19CK1, 19CK1B, 19CK2, 19CK2B, 19CT1 & 19CT1B.
M10	Tuner	TT-37	UHF - Models Y19CK1, Y19CK1B, Y19CK2B, Y19CT1 & Y19CT1B.
M11	Variable Cap.	20A734484	Color Shading - (3.5-25MMF)
M12	4th Video IF Ass'y.	24C734522	Includes M5, Coils & Capacitors
M13	Video Det. Ass'y.	24C734521	Includes M6, Coils & Capacitors
M14	Delay Line	24B731805-A	Luminance Channel
M15	Crystal	48B732230	3.58MC Osc.
M16	Switch		Area Selector (Rotary - Wafer Type)
M17	Magnet	1V734867	Beam Positioning - Includes Magnet Retaining Arm
M18	Magnet	1V734867	Beam Positioning - Includes Magnet Retaining Arm
M19	Magnet	1V734867	Beam Positioning - Includes Magnet Retaining Arm
M20	Magnet	59A733739	Blue Beam Lateral Corrector
M21	Magnet	59A734620	Purity Control
M22	Ferrite Shield	42B735749	Yoke
M23	Picture Tube Rim		
	Purity Strap	1V735816	Includes Magnets
	Cabinet	16E733773	Models 19CK1 & Y19CK1
	Cabinet	16K733774	Models 19CK1B & Y19CK1B
	Cabinet	16E734159	Model 19CK2
	Cabinet	16K734161	Models 19CK2B & Y19CK2B
	Cabinet	16E733795	Models 19CT1 & Y19CT1
	Cabinet	16K733796	Models 19CT1B & Y19CT1B
	Knob	36K733398	VHF Channel Sel. - Models 19CK1, 19CK1B, 19CK2, 19CK2B, 19CT1 & 19CT1B.
	Knob	36B733397	VHF Channel Sel. - Models Y19CK1, Y19CK1B, Y19CK2B, Y19CT1 & Y19CT1B.
	Knob	36A734769	Color Shade
	Knob	36B712294	Area Selector Switch
	Knob	36C733399	Brightness
	Knob	36A734772	Contrast & Chroma
	Knob	36B733395	Fine Tuning & On/Off/Volume
	Knob	36C730167	Tone
	Knob	36C734253	Medallion
	Jewel	61B730644	Dial Light
	Safety Glass	61K733730	
	Mask	13F733733	



VERTICAL CHASSIS TOP VIEW



VERTICAL CHASSIS BOTTOM VIEW RESISTOR AND INDUCTOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

MISCELLANEOUS ADJUSTMENTS (cont.)

BALANCING THE BACKGROUND AND SCREEN CONTROL ADJUSTMENTS

Turn set on and select a station transmitting a black and white picture, preferably a test pattern.

Adjust contrast and brightness control for a normal picture.

Set green screen control (R10A), red screen control (R12A) and blue screen control (R11A) fully clockwise.

Set blue background control (R11B) and the green background control (R10B) for a maximum white amount of white portions on the screen.

Set the brightness control (R2A) toward its counter clockwise position until picture becomes a gray (less white). If when adjusting R2A a color starts to tint the screen, adjust screen control corresponding to this color until the bright portions are white or gray again. Readjust the brightness control (R2A) for normal brightness on the screen. Reset the background controls (R10B & R11B) so that brightness portions of picture appear white. Repeat the above procedure until minimum tinting occurs over the usable range of the brightness control.

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Normally the horizontal hold control will have a sync range of approximately 30 degrees. If the controls are too critical, adjust as follows.

1. Shunt the horizontal oscillator coil (L36) to ground with .25MFD, 400 volt capacitor. This may be done with the chassis in the cabinet by placing the capacitor across the 2 pin socket on rear panel of horizontal chassis.

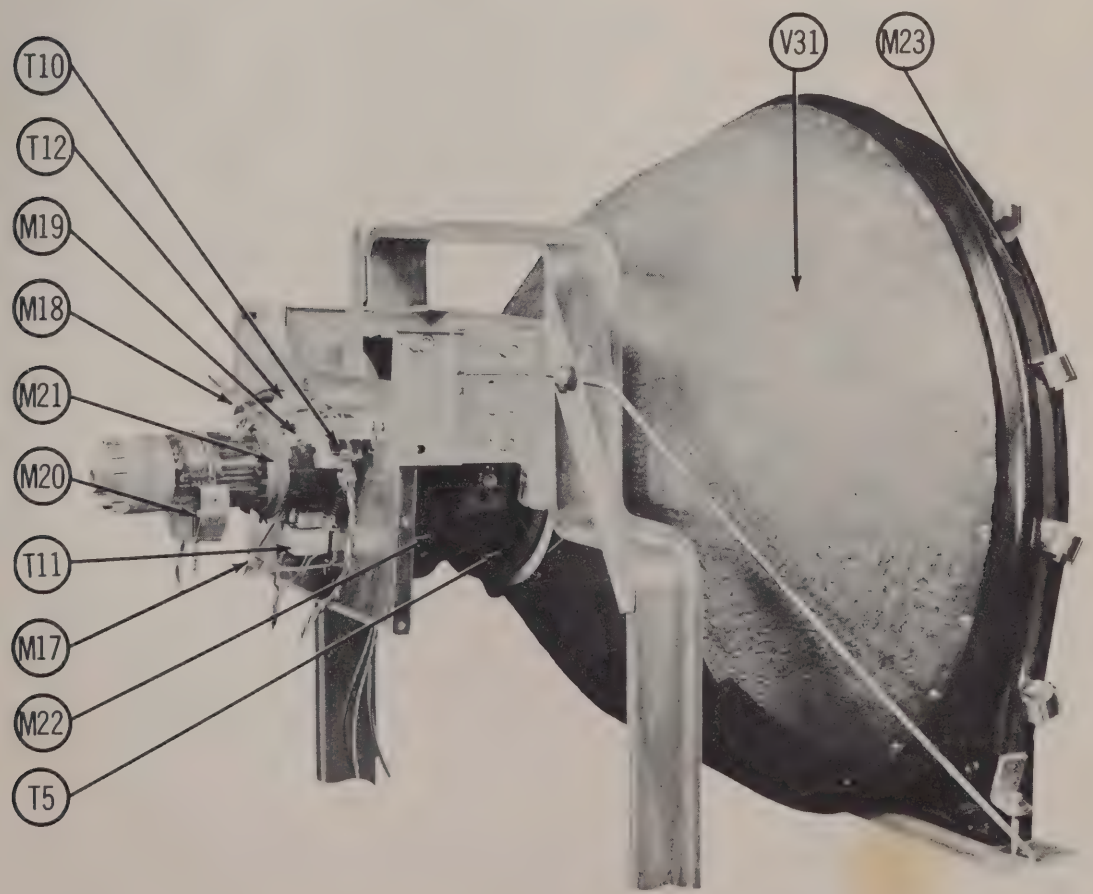
2. With the horizontal size control, adjust the picture so the left edge of the raster can be seen. Adjust the horizontal hold control (R3A) until no blanking pulse appears and the picture just starts to fold on the left. (The blanking pulse is the gray bar just to the left edge of the raster.) If may be necessary to adjust the contrast and brightness controls to make the pulse visible.

3. Remove the .25MFD capacitor across L36.

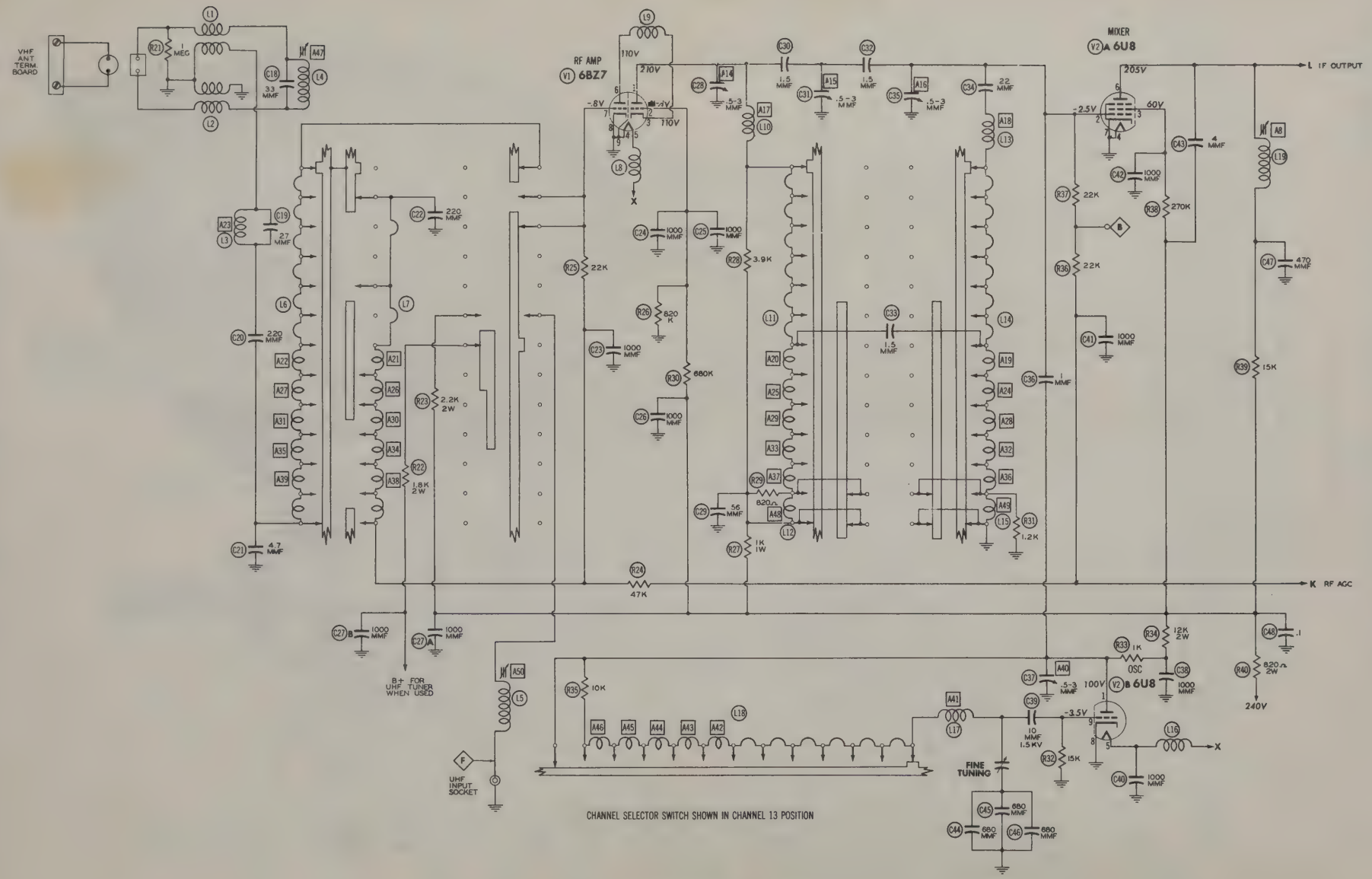
4. Adjust the horizontal oscillator coil slug (B1) until no sync pulse can be seen as in step #2.

Adjust the horizontal drive control (R9A) until white vertical bars or compression appears on the picture tube, then turn in opposite direction until bars or compression disappears.

Adjust the horizontal size adjustment (B2) for a picture slightly wider than necessary to fill the picture mask horizontally. Adjust the horizontal centering control (R8A) to shift the picture from left to right across the screen. Adjust R8A to center picture, preferably while viewing a test pattern.



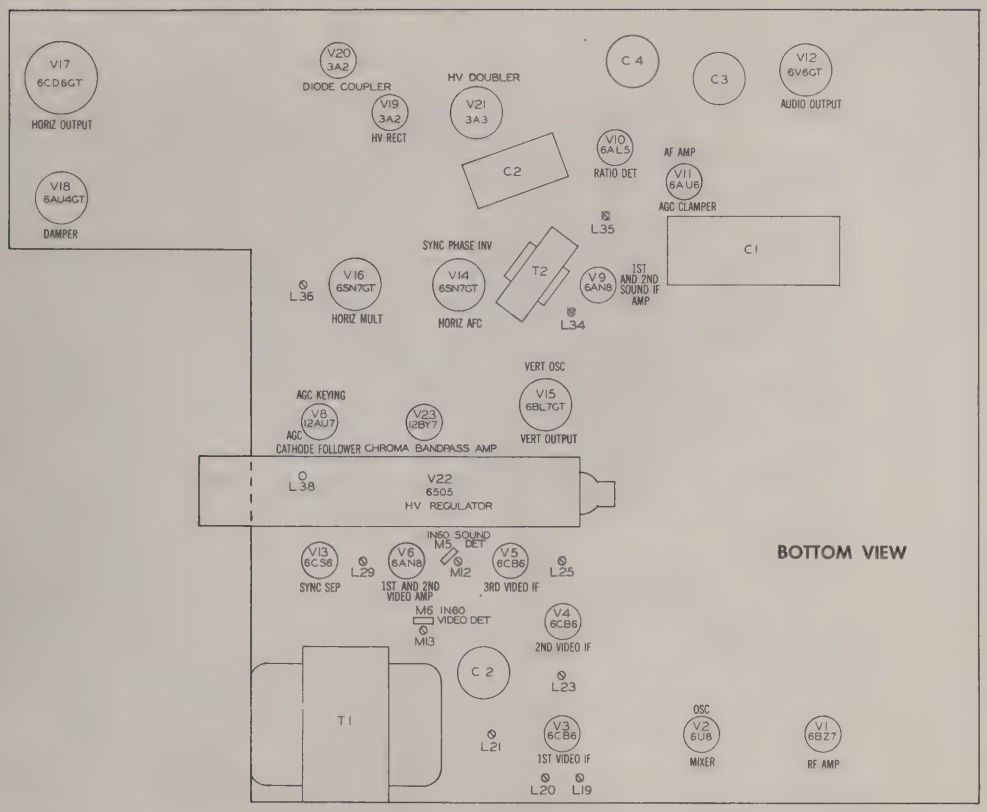
PICTURE TUBE ASSEMBLY

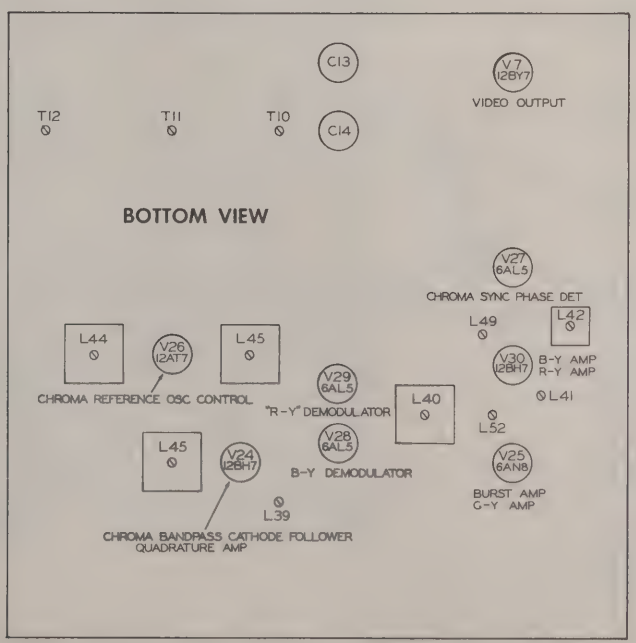


TUNER SCHEMATIC

PROPERTY OF
L. F. SLANKENSHIP
3824 MEADE ST
DENVER, COLORADO

TUBE PLACEMENT CHART





MOTOROLA MODELS 19CK1, B, 19CK2, B, 19CT1, B
(Ch. TS-902A-03, -04 & Ch. BP-902A-01), Y19CK1, B,
Y19CK2, B, Y19CT1, B (Ch. TS-902AY-03, -04 & Ch. BP-902A-01)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE
DENVER, COLORADO

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	MOTOROLA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
				REPLACEMENT DATA					
C154	.01	400	8K490226	DS-103	GP3-333-103	PT401	IMP4-01	330411	
C155	.047	200	8K490206	DF-503		PT1467	IMP3-347	3302147	
C158	10			TCM-10	N750K-100	NT-541		KR-1410	
C157	.1	600	8K490236	DF-104		PT501	IMP6-P1	330601	
C159	10000		2N2482726	DD-103	811-01	DC-511			
C159	10000		2N2482726	DD-103	811-01	DC-511			
C140	10		2N121114	TCM-10	N750K-100	NT-541		KR-1410	
C141	10000		2N2482726	DD-103	811-01	DC-511			
C142	10000		2N2482726	DD-103	811-01	DC-511			
C143	33		2N121548	TCM-33	N750K-330	NT-5433		KR-1433	
C144	33		2N121548	TCM-33	N750K-330	NT-5433		KR-1433	
C145	33		2N121548	TCM-33	N750K-330	NT-5433		KR-1433	
C146	33		2N121548	TCM-33	N750K-330	NT-5433		KR-1433	
C147	270	500	2N15824	TCZ-270	NP0-333-271	MC8241		KR-1527	
C148	10000		2N2482726	DD-103	811-01	DC-511			
C149	5		2N115955	TCZ-5	NP0A-050	ZT-555		K-1550	
C150	10000		2N2482726	DD-103	811-01	DC-511			
C151	1500		2N120100	DD-153	801-0015	DC-5215		K-1215	
C152	1500		2N120100	DD-153	801-0015	DC-5215		K-1215	
C153	10000		2N2482726	DD-103	811-01	DC-511			
C154	.01	400	8K490226	DS-103	GP3-333-103	PT401	IMP4-01	330411	
C155	.22	300	8K490212			PT4023	IMP3-P23	3302322	
C156	2		2N115948	TCZ-2.2	NP0A-2R2				
C157	10000		2N2482726	DD-103	811-01	DC-511			
C158	5		2N115955	TCZ-5	NP0A-050	ZT-555		KR-1550	
C159	10000		2N2482726	DD-103	811-01	DC-511			
C160	100		2N115900	DM-101	GP1K-101	UC-531		K-1310	
C161	56		2N115641	TCM-56	N750K-560			KR-1456	
C162	10000		2N2482726	DD-103	811-01	DC-511			
C163	10000		2N2482726	DD-103	811-01	DC-511			
C164	10000		2N2482726	DD-103	811-01	DC-511			
C165	10000		2N2482726	DD-103	811-01	DC-511			
C165	5		2N115955	TCZ-5	NP0A-050	ZT-555		KR-1550	
C167	5		2N115955	TCZ-5	NP0A-050	ZT-555		KR-1550	
C168	2		2N115948	TCZ-2.2	NP0A-2R2				
C169	.047	1000	2N1U4554	DD-473	831-471	UC-5347		C750-.05	
C170	470							K-1547	

Note 1. In some versions, C4A is 300MFD single unit (part #23DT23710).
Note 2. Non-polarized unit.
Note 3. Not used in some versions.
Note 4. C15C is not used.
* Connect negative terminals together.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
					REPLACEMENT DATA			
R1A	1Meg	½	1RA733887	Q11-157	A47-1Meg-S	AB-U4	U-94	Tone
B	Shaft		Not Req.	Not Req.	K8S-3	AK-4	Not Req.	Attach to R1A
R2A	100KΩ	½	1RD732228	*Q7-947		FI-31	UE11TS	Brightness - Panel
B	1Meg	½				R2-83		Volume tapped at 250KΩ - Rear
C	Switch					KS-1		Attach to R2B
R3A	100KΩ	½	1RD73736	**Q7-843		FI-31	UF15L	Horiz. Hold - Panel
B	200KΩ					R2-33	UR354	Vert. Hold - Rear
R4	2.5Meg		1RK733743					Focus
R5A	500Ω	½	1RD731886			SBBT-746	UF751-TS3	Tapped at 350Ω - Panel
B	1000Ω	½					UR13L	Tapped at 350Ω - Rear
C	Shaft						DS-35	Attach to R5A
R6A	2Meg	½	1RD731880	***Q7-844		FI-67	UF26L	Vert. Size - Panel
B	2000Ω	½				R2-9	UR33L	Vert. Linearity - Rear
R7A	10KΩ	½	1RD732223	Q17-116	A47-10K-V	AB-17	U-19	Color Intensity
B	Shaft		Not Req.	Not Req.	K8S-3	AK-4	Not Req.	Attach to R7A
R8A	20Ω	2	1RD731827			UR1		Horiz. Centering tapped at 10Ω - Panel (Wire wound)
B	20Ω	2						Vert. Centering tapped at 10Ω - Rear (Wire wound)
R9A	5000Ω	4	1RK734928	4WK-5000	A10-5000	SVP-969	M5M PE	Horiz. Drive (Wire wound)
B	Shaft		Not Req.	Not Req.	F2S-1/4	Not Req.	Not Req.	Attach to R9A
R10A	3Meg	½	1RD731833	***Q7-845		FI-78	UE31DS	Green Screen - Panel
B	650Ω	½				R3-1		Green Background - Rear
R11A	3Meg	½	1RK731834	***Q7-846		FI-78	UE3300	Blue Screen - Panel
B	1000Ω	½				R3-4		Blue Background - Rear
R12A	3Meg	½	1RA734621	Q11-140	A47-3Meg-S	AB-R4	U-59	Red Screen
B	Shaft		Not Req.	Not Req.	K8S-3	AK-4	Not Req.	Attach to R12A
R13	1000Ω	½	1RK732740		39-1000			Blue Gain (Wire wound)
R14	250KΩ	½	1RA734485					AFC Balance
R15A	500Ω	½	1RK734497	Q11-105	A47-500-S	AB-4	U-2	Green Horiz. Conv. Amp.
B	Shaft		Not Req.	Not Req.	K8S-3	AK-4	Not Req.	Attach to R15A
R16A	500Ω	½	1RD733740				UR13	Green Vert. Conv. Phase tapped at 50Ω - Panel
B	2500Ω	½						Green Vert. Conv. Amp. tapped at 50Ω - Rear
R17A	500Ω	½	1RK734497	Q11-105	A47-500-S	AB-4	U-2	Blue Horiz. Conv. Amp.
B	Shaft		Not Req.	Not Req.	K8S-3	AK-4	Not Req.	Attach to R17A
R18A	100Ω	½	1RD733740				UR13	Blue Vert. Conv. Phase tapped at 50Ω - Panel
B	2500Ω	½						Blue Vert. Conv. Amp. - Rear
R19A	500Ω	½	1RK734497	Q11-105	A47-500-S	AB-4	U-3	Red. Horiz. Conv. Amp.
B	Shaft		Not Req.	Not Req.	K8S-3	AK-4	Not Req.	Attach to R19A
R20A	100Ω	½	1RD733740				UR13	Red Vert. Conv. Phase tapped at 50Ω - Panel
B	2500Ω	½						Red. Vert. Conv. Amp. - Rear

† Universal replacement (Mallory exact duplicate part no. UE11S)
• Universal replacement (Mallory exact duplicate part no. UE12)
†† Universal replacement (Mallory exact duplicate part no. UE17Z)
* CONCENTRIKIT EQUIVALENT: KIT K-4, BASE ELEMENTS & SHAFTS: B11-128 & P10-308 (PANEL)
B12-137X & R13-331 (REAR)
76-1 SWITCH
** CONCENTRIKIT EQUIVALENT: KIT K-2, BASE ELEMENTS & SHAFTS: B11-128 & P9-209 (PANEL)
B11-129 & R11-316 (REAR)
*** CONCENTRIKIT EQUIVALENT: KIT K-3, BASE ELEMENTS & SHAFTS: B11-139 & P9-209 (PANEL)
B11-128 & R11-316 (REAR)
■ CONCENTRIKIT EQUIVALENT: KIT K-1. BASE ELEMENTS & SHAFTS: B11-140 & P9-212 (PANEL)
B11-105 & R11-219 (REAR)
■■ CONCENTRIKIT EQUIVALENT: KIT K-2, BASE ELEMENTS & SHAFTS: B11-140 & P9-212 (PANEL)
B11-108 & R11-219 (REAR)

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	MOTOROLA PART No.	IRC PART No.	NOTES
			REPLACEMENT DATA		
R21	1Meg	½		BTS-1Meg	
R22	1800Ω	2	6R3064	BTS-1800	
R23	2000Ω	2	6R3067	BTS-2K00	
R24	47KΩ	½	6R3056	BTS-47K	
R25	22KΩ	½	6R3377	BTS-22K	
R26	820KΩ	½	6R6439	BTS-820K	
R27	1000Ω	1	6R6329	BTA-1000	
R28	3900Ω	½	6R3069	BTS-3900	
R29	820Ω	½	6R6369	BTS-820	
R30	680KΩ	½	6R6475	BTS-680K	
R31	3300Ω	½	6R6393	BTS-3300	
R32	15KΩ	½	6R6477	BTS-15K	
R33	1000Ω	½	6R6329	BTS-1000	
R34	12KΩ	2	6R6776	BTS-12K	
R35	10KΩ	½	6R6054	BTS-10K	
R36	22KΩ	½	6R6376	BTS-22K	
R37	22KΩ	½	6R6028	BTS-22K	
R38	270KΩ	½	6R6441	BTS-270K	
R39	15KΩ	½	6R6477	BTS-15K	
R40	82ΩΩ	3	6K1B1897	BTS-82Ω	
R41	12KΩ	½	6R6384	BTS-12K	
R42	470Ω	½	6R3949	BTS-470	
R43	470Ω	½	6R3949	BTS-470	
R44	10KΩ	½	6R6330	BTS-10K	
R45	47Ω	½	6R5550	BTS-47	
R46	470Ω	½	6R3949	BTS-470	
R47	12KΩ	½	6R6394	BTS-12K	
R48	47Ω	½	6R5550	BTS-47	
R49	470Ω	½	6R3949	BTS-470	
R50	470Ω	½	6R3949	BTS-470	
R51	27KΩ	½	6K1B1901	BTA-27K	
R52	18KΩ	½	6R6591	BTS-18K	
R53	12ΩΩ	½	6R6581	BTS-12Ω	
R54	470Ω	½	6R3949	BTS-470	
R55	18KΩ	½	6R6591	BTS-18K	
R56	1000Ω	½	6R6329	BTS-1000	
R57	22KΩ	½	6R6397	BTS-22K	
R58	100KΩ	½	6R6075	BTS-100K	
R59	680KΩ	½	6R6475	BTS-680K	
R60	27KΩ	½	6R6434	BTS-27K	
R61	470ΩΩ	½	6R6580	BTS-470Ω	
R62	47Ω	½	6R5550	BTS-47	
R63	15KΩ	1	6K1B1896	BTA-15K	
R64	820Ω	½	6R6369	BTS-820	
R65	3300Ω	2	6K1B1899	BTS-3300	
R66	1KΩ	½	6R6329	BTS-1000	
R67	1Meg	½	6R6046	BTS-1Meg	
R68	47KΩ	½	6R6048	BTS-47K	
R69	1Meg	½	6R6046	BTS-1Meg	
R70	2200Ω	½	6R6369	BTS-2200	
R71	3700Ω	½	6R6073	BTS-3700	
R72	1Meg	½	6R6046	BTS-1Meg	
R73	18KΩ	2	6R478014	BTS-18K	
R74	5600Ω	½		BTS-5K6	
R75	5000Ω	5	1TR1B1123	1 3/4A-5000	
R76	1000Ω	½	6R6329	BTS-1000	
R77	22KΩ	½	6R6397	BTS-22K	
R78	100KΩ	½	6R6075	BTS-100K	
R79	470KΩ	½	6R6475	BTS-470K	
R80	27KΩ	½	6R6434	BTS-27K	
R81	47ΩΩ	½	6R6580	BTS-47Ω	
R82	33ΩΩ	2	6K1B1898	BTS-33Ω	
R83	15KΩ	1	6K1B1896	BTA-15K	
R84	820Ω	½	6R6369	BTS-820	
R85	3300Ω	2	6K1B1899	BTS-3300	
R86	1KΩ	½	6R6329	BTS-1000	
R87	1Meg	½	6R6046	BTS-1Meg	
R88	47KΩ	½	6R6048	BTS-47K	
R89	1Meg	½	6R6046	BTS-1Meg	
R90	2200Ω	½	6R6369	BTS-2200	
R91	3700Ω	½	6R6073	BTS-3700	
R92	1Meg	½	6R6046	BTS-1Meg	
R93	18KΩ	2	6R478014	BTS-18K	
R94	5600Ω	½		BTS-5K6	
R95	5000Ω	5	1TR1B1123	1 3/4A-5000	
R96	1000Ω	½	6R6329	BTS-1000	
R97	22KΩ	½	6R6397	BTS-22K	
R98	100KΩ	½	6R6075	BTS-100K	
R99	470KΩ	½	6R6475	BTS-470K	
R100	27KΩ	½	6R6434	BTS-27K	
R101	47ΩΩ	½	6R6580	BTS-47Ω	
R102	33ΩΩ	2	6K1B1898	BTS-33Ω	
R103	15KΩ	1	6K1B1896	BTA-15K	
R104	820Ω	½	6R6369	BTS-820	
R105	3300Ω	2	6K1B1899	BTS-3300	
R106	1KΩ	½	6R6329	BTS-1000	
R107	2200Ω	½	6R6067	BTS-2200	
R108	33KΩ	2	6R5788	BTS-33K	

Note 1: Not used in some versions.
Note 2: Some versions may use a 390KΩ resistor in this application.
Note 3: When replacing this resistor, use original clamp or double wattage of replacement resistor.

ITEM No.	RATING OHMS	RATING WATT	MOTOROLA PART No.	IRC PART No.	NOTES
			REPLACEMENT DATA		
R109	100KΩ	½	6R6031	BTS-100K	
R110	33KΩ	½	6R6410	BTS-33K	
R111	5600Ω	½	6R6428	BTS-5600	
R112	220KΩ	½	6R6407	BTS-220K	
R113	33ΩΩ	½	6R6089	BTS-2300	
R114	.47Ω	1	17K488256		
R115	6.8Ω	1			
R116	6800Ω	½	6R6428	BTS-6800	
R117	2200Ω	½	6R6069	BTS-2200	
R118	22KΩ	½	6R6397	BTS-22K	
R119	4700Ω	½	6R6050	BTS-4700	
R120	390KΩ	½	6R5646	BTS-390K	
R121	820KΩ	½		BTS-820K	Note 3
R122	100KΩ	½	6R6031	BTS-100K	
R123	10KΩ	½	6R6330	BTS-10K	
R124	2.2Meg	½	6R6433	BTS-2.2Meg	
R125	82Ω	½	6R2035	BTS-82	
R126	820Ω	½		BTS-820	Note 1
R127	47KΩ	1	6K1B1900	BTA-47K	
R128	820Ω	½	6R5701	BTS-820	
R129	100KΩ	½	6R6031	BTS-100K	
R130	100KΩ	½	6R6031	BTS-100K	
R131	100KΩ	½	6R6031	BTS-100K	
R132	3300Ω	½	6R5659	BTS-3300	
R133	4.7Meg	½	6R3122	BTS-4.7Meg	
R134	100KΩ	½	6R6229	BTS-100K	
R135	5600Ω	½	6R6517	BTS-5600	
R136	680KΩ	½	6R6074	BTS-680K	
R137	47KΩ	½	6R6048	BTS-47K	
R138	3300Ω	½	6R6581	BTS-3300	
R139	10KΩ	½	6R6330	BTS-10K	
R140	1Meg	½	6R6046	BTS-1Meg	
R141	100Ω	½	6R6516	BTS-100	
R142	68Ω	½	6R6007	BTS-68	
R143	5000Ω	5	1TR1B1123	1 3/4A-5000	
R144	22KΩ	½	6R6397	BTS-22K	
R145	3900Ω	2	6R476013	BTS-3900	
R146	470KΩ	1	6K1B1843	BTA-470K	
R147	470KΩ	1	6K1B1843	BTA-470K	
R148	82ΩΩ	2	6R2046	BTS-820	
R149	2.2Meg	2	6R2011	BTS-2.2Meg	
R150	1Meg	½	6R6046	BTS-1Meg	
R151	10KΩ	½	6R6330	BTS-10K	
R152	3300Ω	½	6R6581	BTS-3300	
R153	82Ω	2	6R2035	BTS-82	
R154	220Ω	½	6K1B1874	BTS-220K	
R155	33KΩ	½	6R6410	BTS-33K	
R156	1000Ω	½	6R6329	BTS-1000	
R157	680KΩ	½	6R6074	BTS-680K	
R158	470Ω	½	6R3949	BTS-470	
R159	470Ω	½	6R3949	BTS-470	
R160	1000Ω	½	6R6329	BTS-1000	
R161	10KΩ	1	6R6430	BTA-10K	
R162	33ΩΩ	½		BTS-33Ω	
R163	15KΩ	½	6R6477	BTS-15K	
R164	2200Ω	½	6R6069	BTS-2200	
R165	1Meg	½	6R6046	BTS-1Meg	
R166	1Meg	½	6R6046	BTS-1Meg	
R167	10KΩ	½	6R6330	BTS-10K	
R168	15KΩ	½	6R6477	BTS-15K	
R169	39KΩ	2	6R5731	BTS-39K	
R170	330Ω	½	6R6023	BTS-330	
R171	2200Ω	1	6R6409	BTA-2200	
R172	150KΩ	2	6R6398	BTS-150K	
R173	150KΩ	1	6R5731	BTA-150K	
R174	470Ω	½	6R3949	BTS-470	
R175	470Ω	½	6R3949	BTS-470	
R176	33KΩ	2	6A733145	BTS-33K	Note 3
R177	10KΩ 5%	½	6R5556	BTS-10K 5%	
R178	10KΩ 5%	½	6R5556	BTS-10K 5%	
R179	10KΩ 5%	½	6R5556	BTS-10K 5%	
R180	10KΩ 5%	½	6R5556	BTS-10K 5%	
R181	100KΩ	½	6R6075	BTS-100K	
R182	12KΩ	2	6K12488	BTS-12K	
R183	120ΩΩ	½	6R6393	BTS-1200	
R184	18KΩ	½	6R6591	BTS-18K	
R185	12KΩ	2	6K12488	BTS-12K	
R186	150KΩ	½	6R6398	BTS-150K	
R187	270KΩ	½	6R6441	BTS-270K	
R188	5.6ΩΩ	1	6R6417	BTS-5600	
R189	150Ω	½	6R6373	BTS-150	
R190	15KΩ	½	6R6732	BTS-15K	
R191	390Ω	½	6R5554	BTS-390	
R192	27KΩ	2	6A733772	BTA-27K	Note 3
R193	68KΩ	½	6R6349	BTS-68K	
R194	1500Ω	5	1TK731898	PWT-1500	
R195	7.5Ω		1TA732655		
R196	470KΩ	½		BTS-470K	

TRANSFORMER (POWER)

ITEM No.	RATING			MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
				REPLACEMENT DATA						
T1	PRI	SEC 1	SEC 2	25DT33225A						
	115V (ap @117V 2.9A AC	150VAC .170ADC	6.3VAC @1.3A							
	SEC 3	SEC 4	SEC 5							
	6.3VAC @1¼ 8A									

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	RCA PART No.	Rom PART No.	Stancor TYPE No	Thordarson PART No.	Triad PART No.
		REPLACEMENT DATA							
T2	Vert. Osc. Trans.	25K734746	B6702	A-3003		V405	A-8125	24A87 ②	A-97X
T3	Horiz. Output Trans.	25K734747 ① 24D734467							A-109X
T4	Vert. Output Trans.	25D734978							
T5A	Yoke (62°)(Horiz.)(2MH)	24D734997							
B	Vert(29MH)								
T6A	Width-Parallel Coil (4.8-34MH)	24D733751 ③				20UR17			WC-24
B	-Series Coil (.2-1.5MH)								
T7	Green Horiz. Convergence Phase Coil (3.5-19MH)	24K733734	RF800 ③④	MWC-1 ③⑤	21BR1	20UR16	MWC-5 ③⑤	WC-18 ③	WC-13 ③
T8	Blue Horiz. Convergence Phase Coil (3.5-19MH)	24K733734	RF800 ③④	MWC-1 ③⑤	21BR1	20UR16	MWC-5 ③⑤	WC-18 ③	WC-13 ③
T9	Red Horiz. Convergence Phase Coil (3.5-19MH)	24K733734	RF800 ③④	MWC-1 ③⑤	21BR1	20UR16	MWC-5 ③⑤	WC-18 ③	WC-13 ③
T10	Green Dynamic Convergence Coil	24D734745							
T11	Blue Dynamic Convergence Coil	24D734745							
T12	Red Dynamic Convergence Coil	24D734745							

① Alternate vert. osc. trans.
② Drill new mounting hole(s).
③ Enlarge mounting hole.
④ Connect to terms #1 & #2.
⑤ Connect to coded red and blue terms.
⑥ Includes resistor R145.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
			REPLACEMENT DATA						
T13	6.5KΩ	3.5Ω	25K733208-C	ZLU13	A-3931	A-3978	24S52	S-7X	

SPEAKER

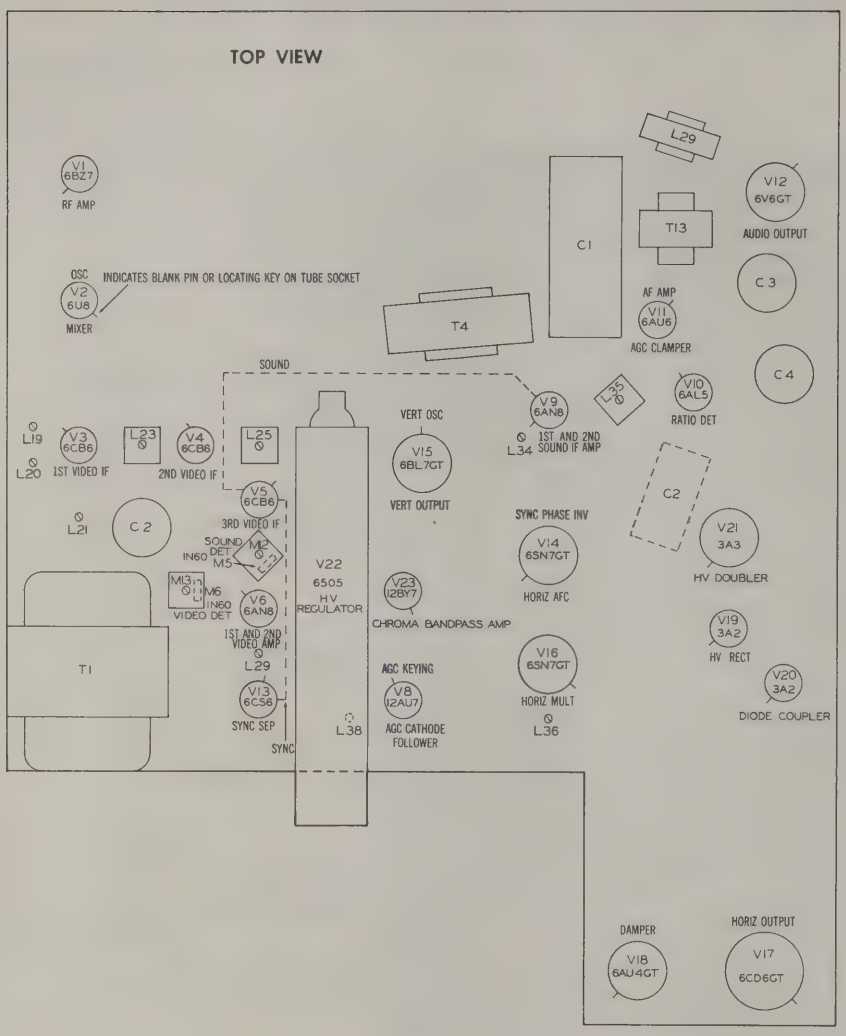
ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V C	RATINGS IMP	MOTOROLA PART No.	QUAM PART No.	NOTES
			REPLACEMENT DATA				
SP1	6"	PM	6.6Ω		50C734443 ①	6A3Z6.6	① 6" speakers have plugs and leads. Used in models 19CT1, B and Y19CT1, B.
SP2	6"	PM	6.6Ω		50C734659 ① 50C734444 ②	6A3Z6.6	② 6" speakers have recpt. Used in models 19CT1, B and Y19CT1, B.
	10"	PM	3.2Ω		50C734275 ① 50C734759 ②	10A3I	① 10" speakers have recpt. Used in models 19CK1, B and Y19CK1, B.
	4"	PM	3.2Ω		50B734220 ①	4A1	② Speaker has plug and leads. Used in models 19CK1, B and Y19CK1, B.
	5" X 7"	PM	6.4Ω		50C734531 ① 50C734534 ②	5A7Z6.6, 4	① 5" X 7" speakers have plugs and leads. Used in models 19CK3, B and Y19CK3, B.
	5" X 7"	PM	6.4Ω		50C734533 ① 50C734760 ②	5A7Z6.4	② 5" X 7" speakers have recpt. Used in models 19CK3, B and Y19CK3, B.

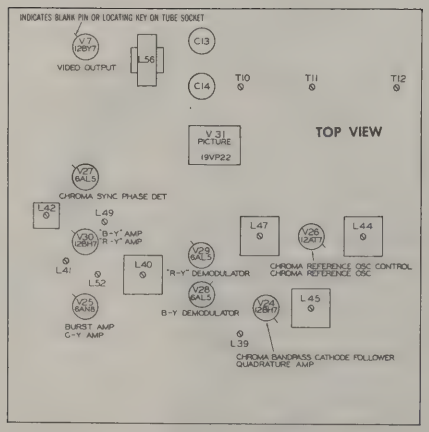
COILS (RF-IF)

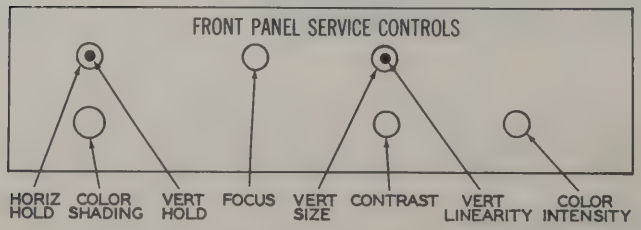
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
				REPLACEMENT DATA				
L1	Ant. Matching Trans.	.7Ω	.7Ω	24K730877				
L2	Ant. Matching Trans.	.7Ω		24K730877				
L3	FM Trap	0Ω		24A721682				
L4	IF Trap	0Ω		24A731357				Core part #46A711260
L5	UHF IF Input	0Ω		24A730748				
L6	VHF Ant. Coils	0Ω		24K722265				
L7	VHF Ant. Trimmer Coils	0Ω		24K732282				Channels 2 thru 7 - Core part #46A711360.
L8	Fil. Choke	0Ω		24A721374				
L9	Neut. Coil	0Ω		24C722256				
L10	RF Coil	0Ω		24K722231				Channel 13
L11	VHF RF Coils	0Ω		24C722262				
L12	UHF RF Coil	0Ω		24K722229				
L13	VHF Mixer Grid Coil	0Ω		24A730100				Channel 13
L14	VHF Mixer Grid Coils	0Ω		24K722263				
L15	UHF Mixer Grid Coil	0Ω		24A721655				
L16	Fil. Choke	0Ω		24A721274				
L17	VHF Osc. Coil	0Ω		24K722233				Channel 13
L18	VHF Osc. Coils	0Ω		24K722264				
L19	Conv. Plate	0Ω		24K732220		TV-1R1	6235	Core part #46K722164
L20	41.35MC Trap	0Ω		24K731693	17-4500*	TV-1S9*	6235	Core part #46K722164
L21	1st Video IF	0Ω		24K732230	17-4522*	TV-1S*	6235	Core part #46K722164
L22	Fil. Choke	0Ω		24A721274	19-1000		4602	L 2 Microbeseries
L23	2nd Video IF	0Ω	0Ω	24K732253		TV-1S8A	6233A	Includes 47.25MC Trap-Core part #46K722164
L24	Fil. Choke	0Ω		24A721274	19-1000		4602	L 2 Microbeseries
L25	3rd Video IF	0Ω	0Ω	24K732303		TV-1S7A	6233A	Includes 39.75MC Trap-Core part #46K722164
L26	RF Choke	5.8Ω		19-1300		TV-1S6*	6154*	330 Microbeseries; Wound on 10KΩ resistor
L27	Series Peaking Coil	5Ω		24H119847	19-3125		6155	330 Microbeseries
L28	Shunt Peaking Coil	8.5Ω		24K119855	19-1300		6155	330 Microbeseries

MOTOROLA MODELS 19CK1, B, 19CK2, B, 19CT1, B (Ch. 15-902A-03); 20-04 B Ch. HP-902A-01); Y19CK1, B, Y19CK2, B, Y19CT1, B (Ch. 15-902A-03); 20-04 B Ch. HP-902A-01)

TUBE PLACEMENT CHART







PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA MOTOROLA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C27A	1000		21R400937	DD2-102	812-001	DCD-521			
B	1000								
C28	.5-3		21K710943	829-3	3115-01-0R5	CT565A			
C29	56		21R120204	TCN-56	N750L-560	NT-5456			
C30	1.5		21R115959	TCZ-1.5	NP0A-1R5	ZT-5515			
C31	.5-3		21K710943	829-3	3115-01-0R5	CT565A			
C32	1.5		21R115959	TCZ-1.5	NP0A-1R5	ZT-5515			
C33	1.5		21R115959	TCZ-1.5	NP0A-1R5	ZT-5515			
C34	22		21R120203	D6-220	GP1K-220	UC-5422			
C35	.5-3		21K710943	829-3	3115-01-0R5	CT565A			
C36	1		21R114071	TCZ-1	NP0A-010				
C37	.5-3		21K710943	829-3	3115-01-0R5	CT565A			
C38	1000		21R115386	DD-102	801-001	DC-521			
C39	10	1500	21R400050						
C40	1000		21R115386	DD-102	801-001	DC-521			
C41	1000		21R115386	DD-102	801-001	DC-521			
C42	1000		21R115386	DD-102	801-001	DC-521			
C43	4		21R115953						
C44	680		21R410124	DD-681	811-681	UC-5368			
C45	680		21R410124	DD-681	811-681	UC-5368			
C46	680		21R410124	DD-681	811-681	UC-5368			
C47	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C48	.1	600	8K490263	DF-104		PT601	IMP6-P1	330601	
C49	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C50	62		21R121598						
C51	62		21R121598						
C52	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C53	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C54	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C55	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C56	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C57	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C58	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C59	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C60	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C61	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C62	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C63	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C64	10		21R121114	TCN-10	N750K-100	NT-541		KR-1410	
C65	120		21R115730	TCN-120	N750L-121			KR-1312	
C66	.1	400	8K490236	DF-104		PT401	IMP4-P1	330401	
C67	5000		21R115312	DD-502	811-005	DC-525		C-1250	
C68	.1	400	8K490236	DF-104		PT401	IMP4-P1	330401	
C69	39		21R121468	TCN-39	N750K-390			KR-1439	
C70	.1	400	8K490236	DF-104		PT401	IMP4-P1	330401	
C71	10000		21R482726	DD-103	811-01	DC-511			
C72	.001	1000	8K490268	DD16-102	IR5KV-102	PT1621	CT16-001	2116-.001	
C73	10000		21R482726	DD-103	811-01	DC-511			
C74	10000		21R482726	DD-103	811-01	DC-511			
C75	2000		21R121106	DD-202	801-002	DC-522		C-1220	
C76	100		21R410036	D6-101	801-101	UC-531		K-1310	
C77	5000		21R115312	DD-502	811-005	DC-525		C-1250	
C78	10000		21R482726	DD-103	811-01	DC-511			
C79	100		21R410036	D6-101	801-101	UC-531		K-1310	
C80	10000		21R482726	DD-103	811-01	DC-511			
C81	10000		21R482726	DD-103	811-01	DC-511			
C82	470		21R115856	DD-471	831-471	UC-5347		K-1347	
C83	1000		21R410127	DD-102	801-001	DC-521	IMP6-D1	K-1210	
C84	5000		21R115312	DD-502	811-005	DC-525	IMP6-D5	C-1250	
C85	4700		21R115867	DD-502	811-005	DC-525	IMP6-D47	C-1247	
C86	470		21R115856	DD-471	831-471	UC-5347		K-1347	
C87	10000		21R482726	DD-103	811-01	DC-511	IMP6-S1	330611	
C88	4700		21R115867	DD-502	811-005	DC-525	IMP6-D47	C-1247	
C89	4700		21R115867	DD-502	811-005	DC-525	IMP6-D47	C-1247	
C90	4700		21R120149	DD-502	811-005	DC-525	IMP6-D47	C-1247	
C91	.022	400	8K490228	DF-203	817-02	CUB4S22	IMP4-S22	3304122	
C92	470		21R115856	DD-471	831-471	UC-5347			
C93	.1	400	8K490236	DF-104		PT401	IMP4-P1	330401	
C94	.047	400	8K119350	DF-503		PT4147	IMP4-S47	3304147	
C95	.0047	600	8K490249	D6-472	GP2-333-472	PT6247	IMP6-D47	3306247	
C96	.0047	400	8K490222	D6-472	GP2-333-472	PT6247	IMP6-D47	3306247	
C97	.015	200	8K119333						
C98	4700		21R115867	D6-472	GP2-333-472	UC-525	IMP6-D47	C-1247	
C99	.047	400	8K119350						
C100	.047	400	8K119350						
C101	.15	400	8K119354			PT4015	IMP4-P15	3304015	
C102	.001	600		D6-102	GP2L-102	PT621	IMP6-D1	330621	
C103	470		21R114554	DD-471	831-471	UC-5347		K-1347	
C104	470		21R115856	D6-471	GP2K-471	UC-5347		K-1347	
C105	470		21R115856	D6-471	GP2K-471	UC-5347		K-1347	
C106	1000		21R118749	D6-102	GP2L-102	UC-521		K-1210	
C107	1000		21R118749	D6-102	GP2L-102	UC-521		K-1210	
C108	6.8		21R120561	TCN-6.8	N750K-6R8				
C109	.0033	600	8K490247	D6-332	GP2-333-332	PT6233	IMP6-D33	3306233	
C110	.01	600	8K490253	D6-103	GP2-333-103	PT611	IMP6-S1	330611	
C111	.0047	400	8K490222	D6-472	GP2-333-472	PT6247	IMP6-D47	3306247	
C112	680	500	21R114781					KR-1368	
C113	470	500	21R6673			MCB245		KR-1347	
C114	220		21R410115	D6-221	811-221	UC-5322		K-1322	
C115	.0047	400	8K490222	D6-472	GP2-333-472	PT6247	IMP6-D47	3306247	
C116	.1	400	8K490236	DF-104		PT401	IMP4-P1	330401	
C117	.047	1000	8K490284			PT16147	CT10-S5	2110-.05	
C118	.22	200	8K490212			PT4022	IMP2-P22	3302022	
C119	130	5000	21R121252					K-5313	
C120	.01	400	8K119346	D6-103	GP2-333-103	PT411	IMP4-S1	330411	
C121	47		21R114207	TCN-47	N750K-470	NT-5447		KR-1447	
C122	500	20000	21A733777	TV3-502	413	HV-20035A			
C123	5000	3000	21R120916						
C124	500	10000	21A732365	TV3-501	413	HV-20035A			
C125	500	10000	21A733779	TV3-501	413	HV-20035A			
C126	500	30000	21A732370	TV8-503	416				
C127	.022	600	8K490255	DF-203	817-02	PT6122	IMP6-S22	3306122	
C128	.022	600	8K490255	DF-203	817-02	PT6122	IMP6-S22	3306122	
C129	.022	600	8K490255	DF-203	817-02	PT6122	IMP6-S22	3306122	
C130	.01	400	8K490226	D6-103	GP2-333-103	PT411	IMP4-S1	330411	
C131	.047	200	8K490206	DF-503		PT4147	IMP2-S47	3302147	
C132	.01	400	8K490226	D6-103	GP2-333-103	PT411	IMP4-S1	330411	
C133	.047	200	8K490206	DF-503		PT4147	IMP2-S47	3302147	

PROPERTY OF
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3924 MEADE ST.
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ALIGNMENT INSTRUCTIONS (cont)

RF AND MIXER ALIGNMENT

Ground the tuner AGC line by grounding the ungrounded side of C9 to chassis. Set the fine tuning control to minimum capacity and remove the tuner shield. Connect a 470MMF capacitor from pin 8 of 6U8 (V2) to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead	185MC (12MC Swp)	181.25MC 185.75MC	6	Vert. Amp. thru 27KΩ to point Ⓐ. Low side to chassis.	A14,A15, A16	Adjust A14, A15 and A16 so that sound and video markers fall within limits shown in Fig. 6. A14 adjusts position of curve. Adjust A15 for proper band width and A16 for correct tilt of response curve.
14.	"	"	213MC (12MC Swp)	211.25MC 215.75MC	13	"	A17,A18	Adjust for response curve similar to Fig.6. Be sure markers fall within limits shown. A18 affects tilt and A17 positions response curve. Recheck channel 8 for proper response. If necessary SLIGHTLY retouch A14, A15 and A16 for proper limits. Adjust A17 and A18 by compressing or expanding coil turns.
15.	"	"	207MC (12MC Swp) 201MC (12MC Swp) 195MC (12MC Swp) 189MC (12MC Swp) 177MC (12MC Swp)	205.25MC 209.75MC 199.25MC 203.75MC 193.25MC 197.75MC 187.25MC 191.75MC 175.25MC 179.75MC	12 11 10 9 7	"		Check for response curve similar to Fig. 6 on all high band channels with tuner shield cover in place. With tuner shield in place markers will move up the curve a short distance but markers should be within tolerance.
16.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	85MC (12MC Swp)	83.25MC 87.75MC	6	Vert Amp thru 27KΩ to point Ⓐ. Low side to chassis.	A19, A20, A21, A22	Adjust A19 thru A22 by compressing or expanding coil turns to obtain response similar to Fig. 7 with markers not falling below 80%. Adjust A19 for position of frequency markers on curve and A20 for MINIMUM tilt. Usually antenna coils need not be adjusted. If necessary, adjust A19 thru A22 to obtain maximum gain with the least tilt on response curve (Fig.7).
17.	"	"	"	"	"	"	A23	Adjust FM trap core, A23, until a slight effect is noted on sound side of response curve.(Fig.7). Adjust by compressing or expanding coil turns.
18.	"	"	79MC (12MC Swp)	77.25MC 81.75MC	5	"	A24, A25, A26, A27	Adjust for proper limits on response curve (Fig.7).
19.	"	"	69MC (12MC Swp)	67.25MC 71.75MC	4	"	A28, A29, A30, A31	"
20.	"	"	63MC (12MC Swp)	61.25MC 65.75MC	3	"	A32, A33, A34, A35	"
21.	"	"	57MC (12MC Swp)	55.25MC 59.75MC	2	"	A36, A37, A38, A39	Adjust for response similar to Fig. 7 for proper limits. Replace tuner shield and recheck channel 13 thru 2. Response of channel 13 thru 7 must be within limits of Fig. 6. Response on channels 6 thru 2 must be within limits of Fig. 7.

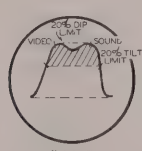


FIG. 7

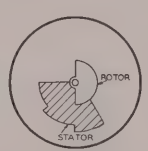


FIG 8

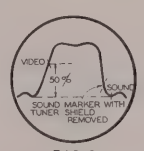


FIG. 9

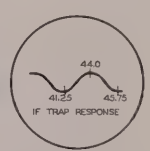


FIG.10

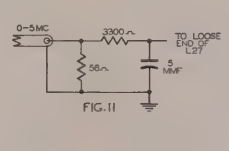


FIG.11

FIG.1

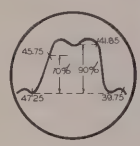


FIG.2

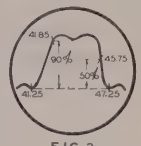


FIG.3

FIG. 4

FIG. 5

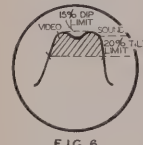


FIG. 6

OSCILLATOR ALIGNMENT

Remove tuner shield and 470MMF capacitor used in "RF & Mixer Alignment".
Set fine tuning control to its mid-range position. See Fig. 8.
Remove tuner AGC short and connect 1kΩ as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
22.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	183MC (12MC Swp) 213MC (12MC Swp) 207MC (12MC Swp) 201MC (12MC Swp) 195MC (12MC Swp) 189MC (12MC Swp) 177MC (12MC Swp)	181.25MC 185.75MC 211.25MC 215.75MC 205.25MC 209.75MC 199.25MC 203.75MC 193.25MC 197.75MC 187.25MC 191.75MC 175.25MC 179.75MC	8 13 12 11 10 9 7	Vert. Amp. thru 27KΩ to point Ⓐ. Low side to chassis.	A40, A41	Adjust to place sound marker SLIGHTLY higher in frequency than the sound trap notch, due to removal of tuner shield. With shield in place, the sound marker should move down in trap notch. Check channels 7 thru 13 noting whether sound marker for each channel falls just above the trap notch with tuner shield removed. Response should be similar to Fig. 8. If more than a 30 degree rotation of fine tuning control is necessary to place sound marker in place on any high band adjust A41 by expanding or compressing coil turns. If A41 is adjusted it may be necessary to readjust A40 on channel 8.
23.	"	"	85MC (12MC Swp)	83.25MC 87.75MC	6	"	A43	Check to see that fine tuning is at mid-position as in Fig. 8. Adjust A43 by compressing or expanding coil to place sound marker just above trap notch as in Fig. 6.
24.	"	"	79MC (12MC Swp) 69MC (12MC Swp) 63MC (12MC Swp) 57MC (12MC Swp)	77.25MC 81.75MC 67.25MC 71.75MC 61.25MC 65.75MC 55.25MC 59.75MC	5 4 3 2	"	A43 A44 A45 A46	Adjust by compressing or expanding coil turns to place sound marker just above trap notch (Fig. 8) with fine tuning control within 10 degrees of position in Fig. 8. Replace tuner shield and check channels 13 thru 2 for proper tracking.

IF TRAP ALIGNMENT

Instructions are the same as for "Oscillator Alignment".

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
25.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	44MC (10MC Swp)	41.25MC 44.0MC 46.75MC	3	Vert. Amp. thru 27KΩ to point Ⓐ. Low side to chassis.	A47	Increase sweep generator output to produce visible response on scope. Adjust A47 for MINIMUM response similar to Fig.10.

UHF ALIGNMENT

Instructions are the same as for "RF & Mixer Alignment".

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
26.	Direct	High side to point Ⓕ. Low side to chassis.	44MC (12MC Swp)	41.25MC 45.75MC	UHF or Channel 1 Position	Vert Amp to point Ⓑ thru 27KΩ. Low side to chassis.	A48, A49, A50	Adjust A48 and A49 to position the sound and picture marker on response curve as in Fig. 7. Adjust A50 for MINIMUM curve tilt. Markers should not fall below the 20% limit on response curve. Replace tuner shield and recheck for correct response.

CHROMINANCE BANDPASS SYSTEM ALIGNMENT

Remove L27 by unsoldering one end which fastens to terminal #4 of video detector assembly (M13). Connect sweep generator to loose end of L27 thru network. (Fig.11)
Remove the 3.58MC color oscillator tube (V20) from its socket. Connect a .05MFD capacitor from point Ⓓ to chassis.
Set color intensity control (R7A) and contrast control (R5A) fully clockwise.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
27.	Fig. 11	High side thru network (Fig. 11) to loose end of L27. Low side to chassis.	5MC (10MC Swp)	4.5MC	UHF or Channel 1 Position	Vert. Amp. to point Ⓓ. Low side to chassis.	A51	Adjust so that trap notch falls at 4.5MC. Use sufficient generator output so that trap notch is clearly defined (Fig.12).
28.	"	"	"	2.5MC	"	"	A52	Adjust to position 2.5MC marker on top of response curve similar to Fig.12.
29.	"	"	"	2.0MC 2.5MC 3.5MC 4.0MC 4.5MC	"	"	A53	Adjust A53 for MINIMUM tilt and a symmetrical response curve similar to Fig. 12. Check markers on response curve. If necessary SLIGHTLY retouch A51, A52 and A53 for desired response and marker positions.

3.58MC TRAP ALIGNMENT

Remove .05MFD capacitor from point Ⓓ to chassis. Use same instructions as for "Chrominance Bandpass System Alignment".

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
30.	Fig. 11	High side thru network (Fig. 11) to loose end of L27. Low side to chassis.	3MC (10MC Swp)	3.58MC	UHF or Channel 1 Position	Vert. Amp. thru detector probe (Fig. 13) to pin 4, 8 or 13 of picture tube. Low side to chassis.	A54	Adjust to place 3.58MC in trap notch similar to Fig. 14. Response curve must be free of any regeneration shown as sharp peak on response curve. Use sufficient generator output so that trap notch is clearly defined.

MOTOROLA MODELS 19CK1, B, 19CK2, B, 19CT1, B
19CK3, B, 19CT3, B (CH. 13-82A4-03, -04 & CH. 19K-82A4-01)

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L29	4.5MC Trap	1.2Ω		24B731883	20-1004	TV-151	1469	Core part #46B790943
L30	Shunt Peaking Coil	7.5Ω			19-3250	TV-185	6154	226 Microhenries
L31	Series Peaking Coil	7Ω		24R121805	19-4200	TV-185♦	6154♦	222 Microhenries;Wound on 10KΩ resistor - Core part #46B790943
L32	3.58MC Trap	2.7Ω		1V732586			1469	Core part #46B790943
L33	Shunt Peaking Coil	9.3Ω		24R119856	19-3300	TV-190	6155	330 Microhenries
L34	2nd Sound IF	1.8Ω		1V733254	20-1004	TV-151	1470	
L35	Ratio Det.	6.8Ω	1.4ΩCT	24C734459	17-3497	TV-115	6205	Tertiary winding=.8Ω
L36	Horiz. Osc.	36Ω		24K721065	19-1576	TV-163	6210	Core part #46A780344
L37	Shunt Peaking Coil	8.3Ω		24R119855	19-3300	TV-190	6155	300 Microhenries
L38	3.58MC Band-pass Amp.	7.5Ω	1.5Ω	24K734252				
L39	Bandpass cathode follower grid	.7Ω	6.3Ω	24B734844				
L40	Bandpass cathode follower cathode	40Ω	40Ω	24B733747				
L41	3.58MC Burst Amp. Coil	1.1Ω		24B734843				Tapped at .2Ω - Core part #46B790943
L42	3.58MC Burst Amp. Trans.	6Ω	2.4ΩCT	24C734483	17-6012			
L43	RF Choke	2Ω		24R121453	19-6033▪		4626▪	27 Microhenries;Wound on 560Ω resistor Core part #46B790943
L44	Reactance Coil	4.4Ω		24B732205	17-6015			Tapped at .4Ω;Includes caps. - Core part #46B790943
L45	3.58MC Osc.			1V734277				
L46	RF Choke	8.5Ω		24R119855	19-3300	TV-190	6155	300 Microhenries
L47	Quadrature Trans.			24B733760				Includes caps. -R-Y winding=.7Ω;Tapped at .3Ω - B-Y winding=.7Ω Core part #46K732255
L48	Series Peaking Coil	19.5Ω		24B732672	19-4950		4652	900 Microhenries
L49	3.58MC Trap	5.5Ω		1V732207			1470	
L50	Series Peaking Coil	75Ω		24K733200	19-5101	BC-502	4664	1750 Microhenries
L51	Series Peaking Coil	19.5Ω		24B732672	19-4950		4652	900 Microhenries Core part #46B790943
L52	3.58MC Trap	5.5Ω		1V732207				
L53	Series Peaking Coil	75Ω		24K733200	19-1501	BC-502	4664	1750 Microhenries

* Use trap winding only.
■ Use one winding only.
▲ Use adaptor plate, drill mounting holes and retune.
♦ Parallel with 10KΩ resistor.
▪ Parallel with 560Ω resistor.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L54	.380ADC	28.2Ω	1.1HY	25B734495A	C5041				
L55	.170ADC	22.6Ω	.43HY	25B734908	C5041 ①		C-2328①		C-23X①
L56	.015A-.050A	39Ω	2HY	25B734494					

① Drill one new mounting hole.

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	MOTOROLA PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.460ADC	48B733746	1268				607	
M2	.460ADC	48B733746	1268				607	
M3	.170ADC	48B733961	1255A	8RS200	8S200		307	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M4	1" piece of #26 wire							

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		MOTOROLA PART No.	SYLVANIA PART No.		
M5	1N60	48C711052*			Sound Det.
M6	1N60	48C711052*			Video Det.
M7	1N60	48C711052*			Burst Boost Pulse Clamping

* Alternate part #48K711077.

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

AC line voltages must be maintained at 117V, if necessary, adjust with a variac.
Use only enough signal generator output to produce useable pattern on scope.
Remove the horizontal output tube (V17) from its socket during alignment to eliminate the high voltage shock hazard. The correct setting of cores is away from center of the coil forms.
Allow proper time for receiver and test equipment to warm up.
Connect a 2500Ω 25 watt resistor from point Ⓔ to chassis to normalize B+.
Use an isolation transformer to protect the test equipment.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt bias supply to the ungrounded side of C10. Positive lead to chassis.
Short L13 to chassis. Hole is provided through tuner shield. This will disable the local oscillator.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	470MMF Capacitor	High side to pin 1 (grid) of 6CB6 (V5) thru 470 MMF capacitor. Low side to chassis.	43.8MC (10MC Swp)	41.25MC	Any non-interfering channel	Vert. Amp. thru a 27KΩ resistor to point Ⓐ. Low side to chassis.	A1	Adjust A1 for MINIMUM trap dip on response curve (Fig. 1).
2.	"	"	"	45.75MC	"	"	A2	Adjust A2 to place 45.75MC marker on response curve as in Fig. 1.
3.	"	"	"	41.85MC	"	"	A3	Adjust A3 to place 41.85MC marker on response curve as in Fig. 1.
4.	"	High side to pin 1 (grid) of 6CB6 (V3) thru 470MMF. Low side to chassis.	"	47.25MC	"	"	A4	Adjust so that trap notch falls at 47.25MC (Fig. 2)
5.	"	"	"	39.75MC	"	"	A5	Adjust so that trap notch falls at 39.75MC (Fig. 2).
6.	"	"	"	45.75MC	"	"	A6	Adjust to place marker at approximately the 70% point on response curve (Fig. 2).
7.	"	"	"	41.85MC	"	"	A7	Adjust to place marker at approximately the 90% point on response curve (Fig. 2).
8.	"	High side thru 470MMF to point Ⓑ. Low side to chassis.	"	45.75MC	"	"	A8, A9	Simultaneously adjust A8 and A9 so that the 45.75MC marker falls at the 50% point on response curve (Fig. 3) and until the 41.85MC marker falls at no less than the 90% point on response curve (Fig. 3).
9.	"	"	"	41.25MC	"	"	A10	Adjust so that trap notch falls at 41.25MC. Temporarily remove the -3 volt bias to provide better trap notch definition (Fig. 3). Recheck step 8.
10.	"	"	43.8MC (10MC Swp)	47.25MC 45.75MC 41.85MC 41.25MC	"	"		Check markers on response curve as in Fig. 3. If A8 and A9 will not place the markers within limits, slightly retouch A6 or A7 for proper marker positions on response curve (Fig. 3). Remove bias from IF AGC and attenuate sweep generator output until same level on response curve is reached as before bias removed. Band width should not change more than .2MC. Observe response curve for any regeneration. It will be indicated by sharp peak on response curve.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Remove V5 from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11.	Direct	High side to pin 2 (grid) of 6AN8 (V9). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point Ⓒ. Common to chassis.	A11, A12	Adjust for maximum deflection.
12.	"	"	"	"	DC probe to point Ⓓ. Common to chassis.	A13	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Replace V5 in its socket.

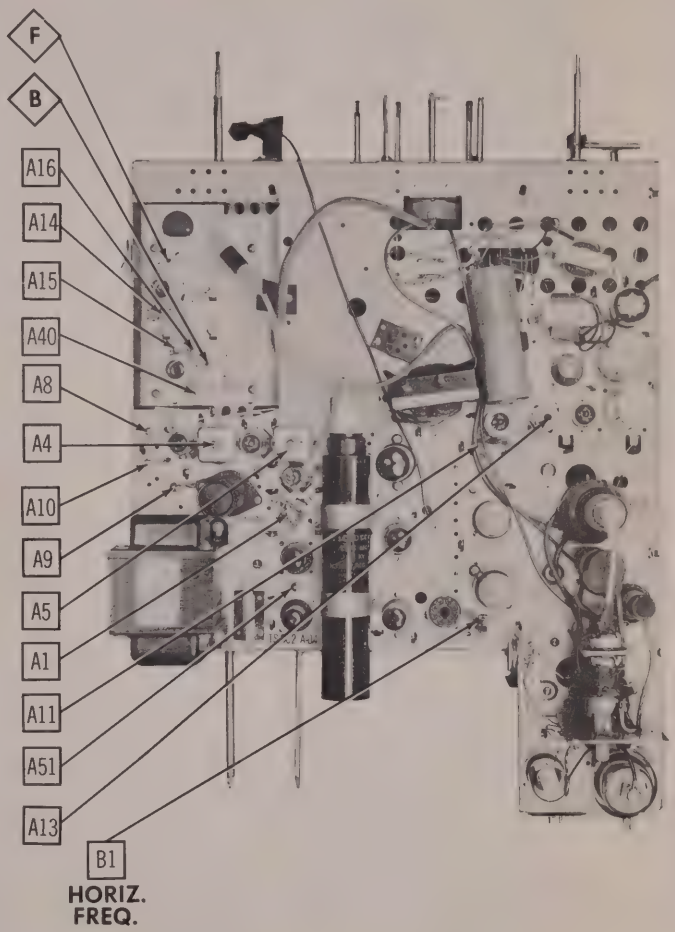
SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Remove V5 from its socket.
Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Direct	High side to pin 2 (grid) of 6AN8 (V9). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. thru 27KΩ to point Ⓒ. Low side to chassis.	A11, A12	Disconnect stabilizing capacitor C11. Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
12.	"	"	"	"	"	Vert. Amp. thru 27KΩ to point Ⓐ. Low side to chassis.	A13	Reconnect stabilizing capacitor C11. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 5. SLIGHTLY retouch A12 for maximum amplitude and straightness of crossover lines. Replace V5 in its socket.

SOUND IF ALIGNMENT USING TV SIGNAL AND VTVM

This method provides an accurate signal source.
Tune in a TV station. Connect DC probe of VTVM to point Ⓒ. Common to chassis. Turn fine tuning control slightly off station so that VTVM reads approximately 5 volts and adjust A11 and A12 for maximum deflection.
Remove VTVM and adjust A13 for best program sound and minimum buzz.



CHASSIS TOP VIEW ALIGNMENT IDENTIFICATION

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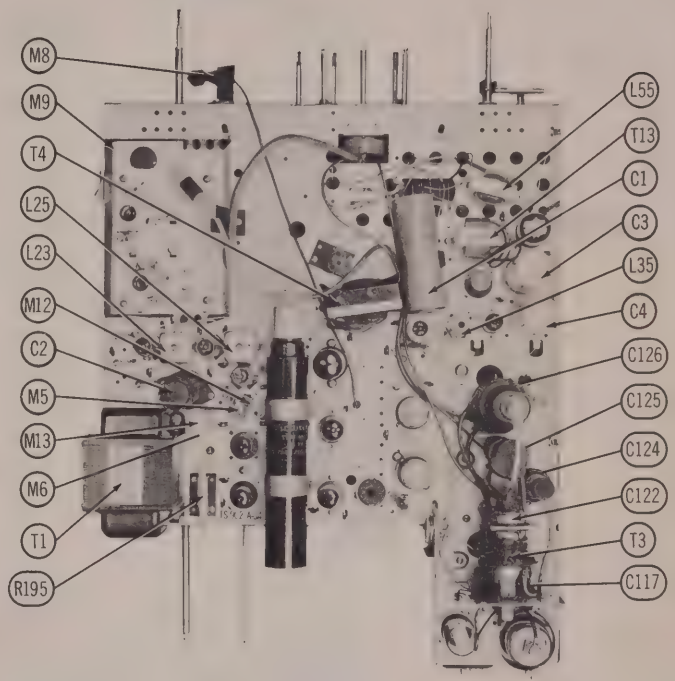
L. F. ...



CHASSIS TOP VIEW TRANS. AND INDUCTOR IDENTIFICATION

ALIGNMENT INSTRUCTIONS (cont)

3.58MC TRAPS IN GRID OF THE "R-Y" AND "B-Y" AMPLIFIER ALIGNMENT

Set the color intensity control (R7) fully counter clockwise.
Replace V26 in its socket and make sure the chroma reference oscillator is operating properly.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
31.		Use leakage signal from 3.58MC local color oscillator in set.	Not used	Not used	Any	Vert. Amp. to pin 7 (grid) of 12BH7 (V30B). Low side to chassis.	A55	Adjust for MINIMUM 3.58MC indication on scope.
32.		"	"	"	"	Vert. amp. to pin 2 (grid) of 12BH7 (V30A). Low side to chassis.	A56	"

CHROMA REFERENCE OSCILLATOR AND BUFFER STAGE ALIGNMENT

Replace V17 in its socket. Connect yoke and picture tube. Connect a clip lead from point Ⓘ to chassis. Set color intensity control (R7A) and contrast control (R5A) fully counter clockwise.
Turn coils fully counter clockwise, away from center of the coil forms.
Connect the DC probe of a VTVM to point Ⓗ. Common to chassis.
Allow set to warm up. Using the frequency of the crystal to tune the 3.58MC color oscillator tank coil and the oscillator buffer stages, adjust as outlined below.

1. Adjust A57 for maximum deflection.
2. Adjust A58 for maximum deflection.
3. Adjust A59 for MINIMUM deflection.
4. Repeat steps 1, 2 and 3 to make certain adjustments are accurate.
5. Readjust A57 counter clockwise until a reading of approximately 25 volts is measured on VTVM. Remove short from point Ⓘ to chassis.

CHROMA REFERENCE OSCILLATOR CONTROL SYSTEM ALIGNMENT

Connect DC probe of VTVM to pin 2 of 6AL5 (V27B). Common to chassis. Momentarily short pin 8 (grid) of 6AN8 (V25A) to chassis, to eliminate the unwanted incoming signals and check the injection voltage to make certain the chroma reference oscillator is working properly. The VTVM should read approximately 12 volts of injection voltage.
Set the color shading control (M11) at its mid-range position.
Rotate A60 and A61 fully counter clockwise, away from the center of coil. Reconnect L27 to terminal 4 of M13. Connect a 100% saturated color bar generator across antenna terminals. (A TV color signal may be used if available.)

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
33.	Direct	Use color bar generator across antenna terminals.			DC probe to pin 2 (grid) of 6AL5 (V27B). Common to chassis.	A60, A61	Adjust for maximum deflection.
34.	"	"			DC probe to point Ⓘ. Common to chassis.	A62	Check oscillator sync, If necessary adjust A62 to bring oscillator in sync. With oscillator in sync VTVM should read 0 volts at point Ⓘ.
35.	Decrease color bar generator output until the chrominance signal is just visible on picture tube screen. If picture loses sync adjust AFC balance control (R14) until 3.58MC oscillator synchronizes. Reset output for normal chrominance signal. Connect the vertical amplifier of a scope to pin 6 (plate) of V30B., low side to chassis and readjust A60 for MINIMUM amplitude on scope.						

"R-Y" AND "B-Y" BALANCE ADJUSTMENTS

Connect a color signal generator, providing ±R-Y and ±B-Y signals, across antenna terminals. Connect the vertical amplifier of the oscilloscope to pin 2 (grid) of picture tube. Connect low side to chassis.
Set the color shading control (M11) at its mid-range position. Adjust A58 for zero B-Y signal indication on scope. Move the scope to pin 12 (grid) of picture tube. Connect low side to chassis. Adjust A59 for zero R-Y signal indication on scope. Move scope back to pin 7 of V30A and recheck for zero indication of B-Y signal on scope.

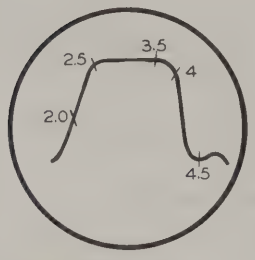


FIG. 12

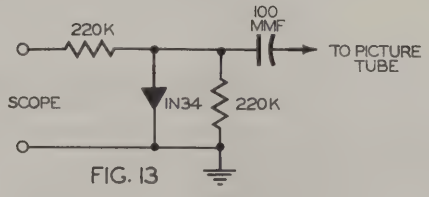


FIG. 13

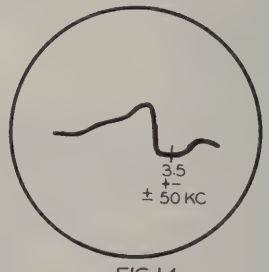


FIG. 14

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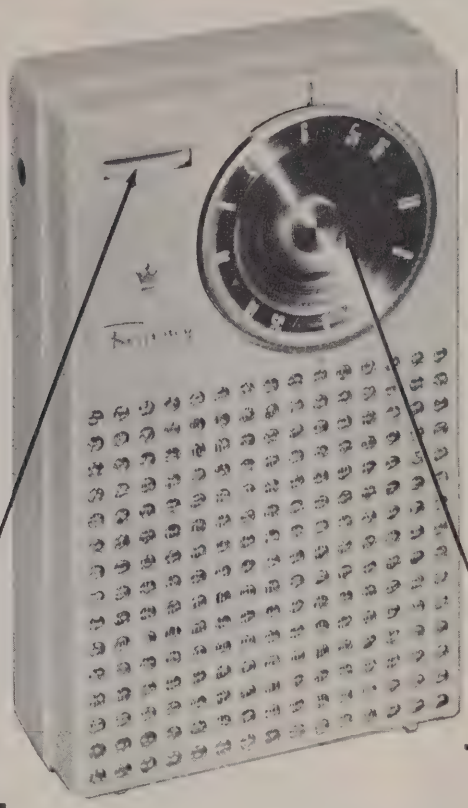
DENVER, COLORADO

REGENCY
MODEL TR-1



REGENCY
MODEL TR-1

TRADE NAME	Regency Model TR-1
MANUFACTURER	Regency Div., I.D.E.A., Inc., 7900 Pendleton Pike, Indianapolis 26, Indiana
TYPE SET	Battery Operated Portable Transistorized AM Superheterodyne Receiver
POWER SUPPLY	22½ Volts "B" Battery RATING Approx. 4 MA @ 22½ Volts DC
TUNING RANGE—BROADCAST	535KC-1630KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain and output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	262KC (400~Mod)	Tuning gang fully open	Across ear-phone jack	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.		"	535KC	Tuning gang fully closed	"	A4	"
3.		"	1630KC	Tuning gang fully open	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Repeat steps 2 and 3.
4.		"	1500KC	Tune for max. signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. With tuning gang fully open, freq. range should extend to 1630KC. If not, repeat steps 3 and 4.

FOR THOSE PERSONS DESIRING MORE SERVICE INFORMATION ON SERVICING TECHNIQUES OF TRANSISTORIZED RECEIVERS, THE ARTICLE, " SERVICING THE TRANSISTOR RADIO" IN THE MARCH, 1955 ISSUE OF THE PF REPORTER, IS RECOMMENDED.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

REGENCY
MODEL TR-1

TRANSISTORS

ITEM No.	REGENCY PART No.	USE	NOTES
X1	100-626	Converter	① C10 must be replaced with cap. supplied with transistor if different value.
X2	100-767 ①	IF Amplifier	② C13 must be replaced with cap. supplied with transistor if different value.
X3	100-767 ②	IF Amplifier	
X4	100-628	Output	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	REGENCY PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1	5	25	100-474-3						
C2	40	3							
C3	2	3	100-473-1						
C4	40	3	100-473-2						
C5	20000		20-075-23						
C6	268		100-771					KR-1327	
C7	10000		20-075-22	DD6-103	811-01	DC-511			
C8	1000		20-075-21	DD-102	811-102	DC-521			
C9	50000		100-772						
C10									Note 1
C11	1000		20-075-21	DD-102	811-102	DC-521			
C12	50000		100-772						
C13									Note 1
C14	1000		20-075-21	DD-102	811-102	DC-521			
C15	20000		20-075-23	DD-203	817-02				
C16	1000		20-075-21	DD-102	811-102	DC-521			

Note 1. If capacitor is replaced, replace with identical value. If transistor is replaced, capacitor must be replaced with capacitor supplied with transistor if it is a different value than the original.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	REGENCY PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1	1000Ω	½	100-596-2					Volume

RESISTORS

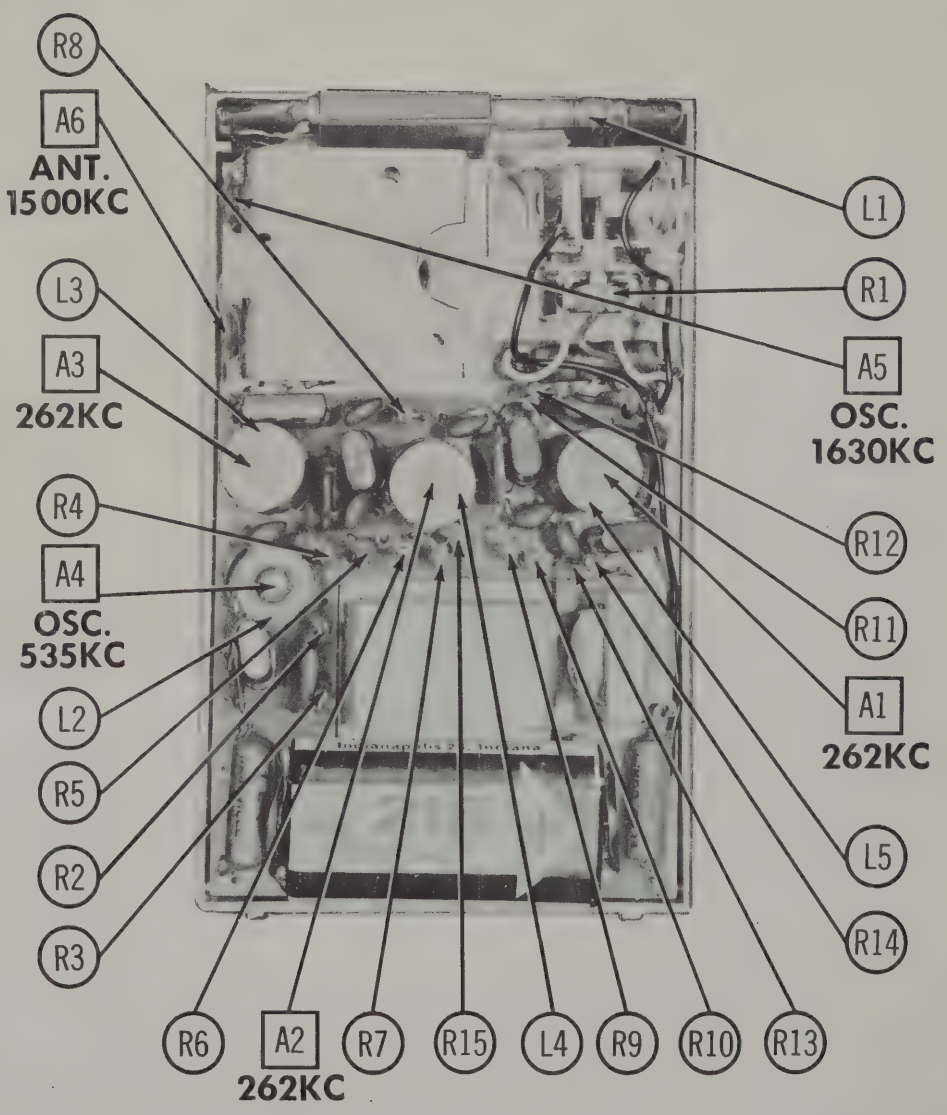
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	REGENCY PART No.	IRC PART No.	
R2	470KΩ	1/3		BTR-470K	
R3	10KΩ	1/3		BTR-10K	
R4	2200Ω	1/3		BTR-2200	
R5	100KΩ	1/3		BTR-100K	
R6	560Ω	1/3		BTR-560	
R7	2200Ω	1/3		BTR-2200	
R8	560Ω	1/3		BTR-560	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	REGENCY PART No.	IRC PART No.	
R9	2700Ω	1/3		BTR-2700	
R10	2200Ω	1/3		BTR-2200	
R11	560Ω	1/3		BTR-560	
R12	2700Ω	1/3		BTR-2700	
R13	3900Ω	1/3		BTR-3900	
R14	33KΩ	1/3		BTR-33K	
R15	1000Ω	1/3		BTR-1000	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	REGENCY PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	9.8KΩ	15Ω	100-629						

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	REGENCY PART No.	QUAM PART No.	
SP1	2 3/4"	PM	15Ω	100-766		

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	REGENCY PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	5.3Ω		300-432				Tapped @ .2Ω
L2	Osc. Coil	1.3Ω	11Ω *	100-731				* Tapped @ .2Ω
L3	1st. IF Trans	8.5Ω	.85Ω	100-728				
L4	2nd.IF Trans	9Ω	1Ω	100-728				
L5	3rd.IF Trans	8.5Ω	1Ω	100-728				

BATTERIES

ITEM No.	VOLTAGE	REGENCY PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M1	22.5V	215		412			U15 or Y15		

CRYSTAL DIODES

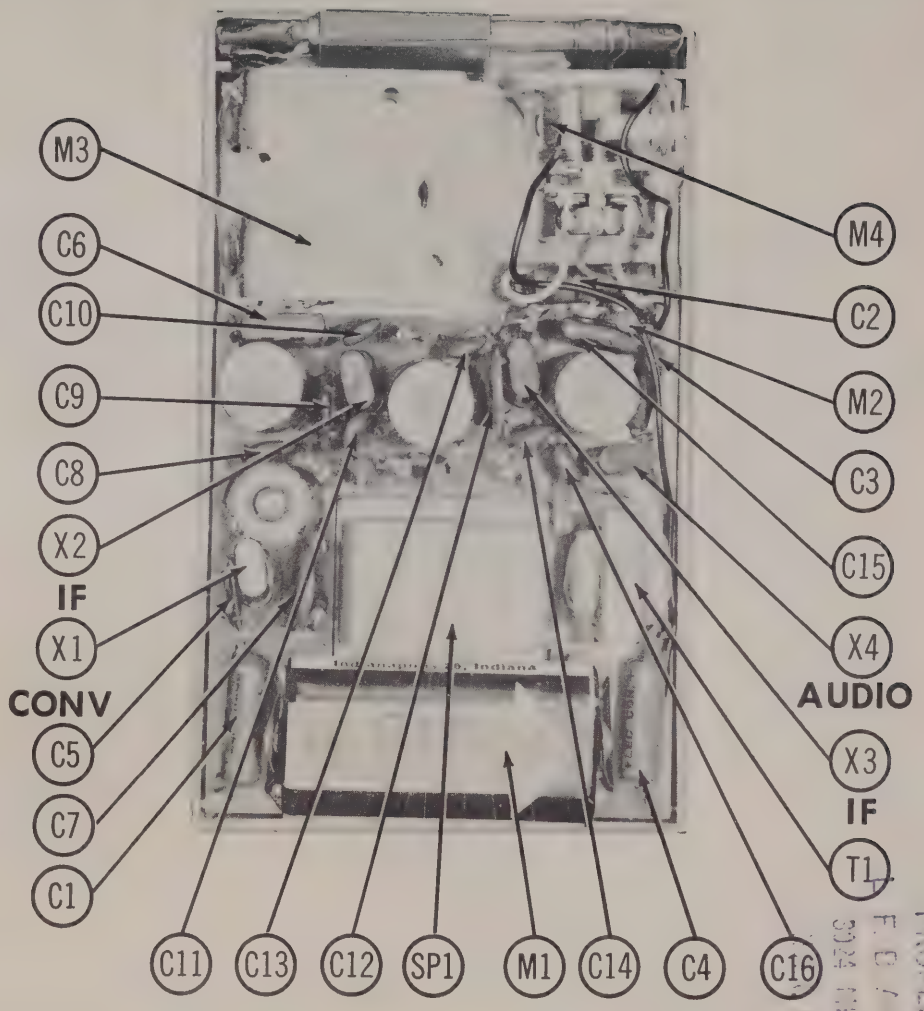
ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		REGENCY PART No.	SYLVANIA PART No.		
M2	CK706A *		1N60 or 1N132		Audio Det.

* Some versions may use DR117 crystal diode in this application.

MISCELLANEOUS

ITEM No.	PART NAME	REGENCY PART No.	NOTES
M3	Tuning Cap.	300-433	2 Gang (9-135MMF, 8-110MMF)
M4	Switch		On-off (Switch consists of two contacts actuated by volume control knob) Contact part # 300-437 and 300-439
	Case	600-061	
	Knob	300-435	Volume
	Dial	100-732	

CHASSIS—TOP VIEW



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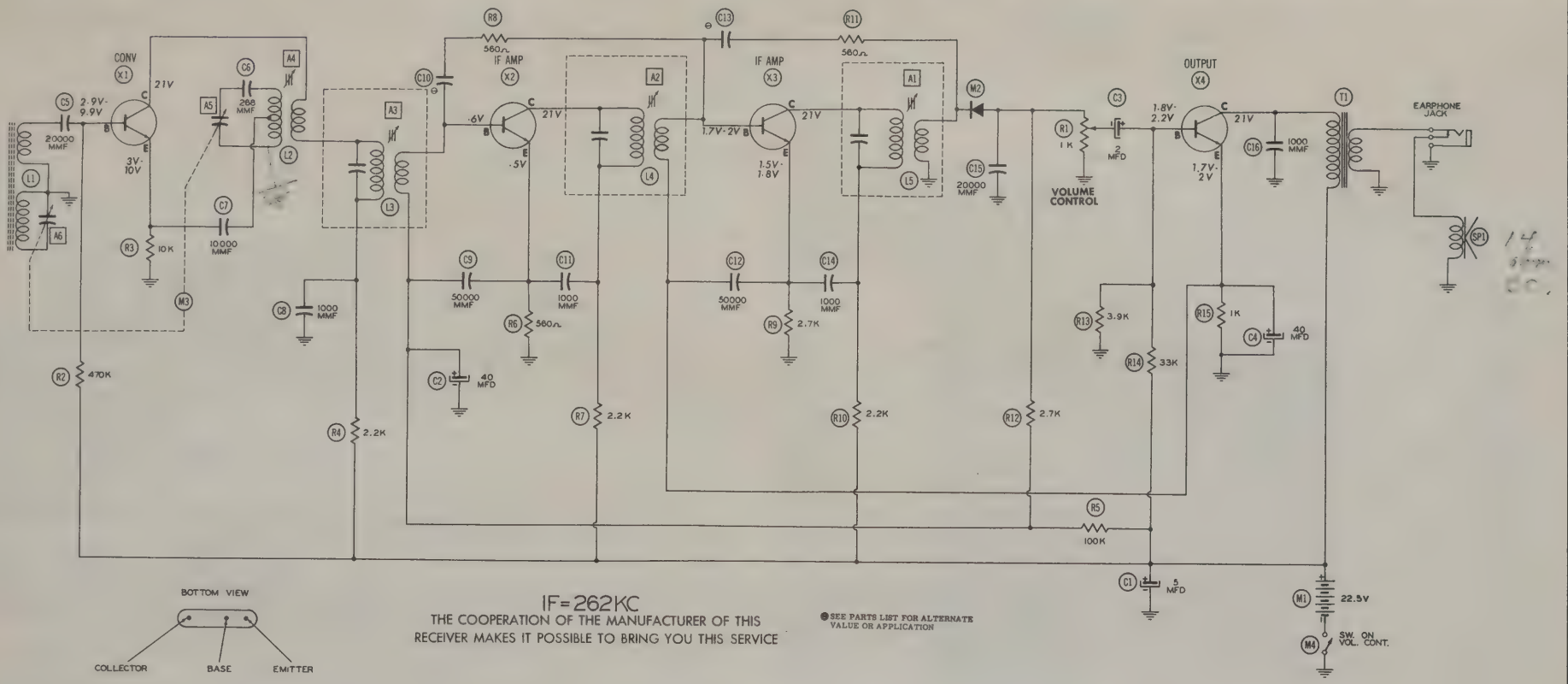
3084 MAPLE ST.
COLORADO

REGENCY MODEL TR-1

REGENCY MODEL TR-1



BOTTOM VIEW

IF=262KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE

Transistor Item No.	BASE	BASE (With Meter Leads Reversed)	EMITTER	COLLECTOR
X1	7KΩ	70KΩ	10KΩ	†2.2KΩ
X2	600Ω	3KΩ	550Ω	†2.3KΩ
X3	750Ω	725Ω	2.7KΩ	†2.2KΩ
X4	850Ω	3.5KΩ	750Ω	†850Ω

CAUTION: DO NOT USE OHMMETER HAVING INTERNAL BATTERY LARGER THAN 3 VOLTS OR TRANSISTORS MAY BE DAMAGED.

RESISTANCE MEASUREMENTS TAKEN WITH POSITIVE VOLTAGE PROBE (NOT NECESSARILY THE RED PROBE) CONNECTED TO TERMINAL BEING MEASURED.

† MEASURED FROM BATTERY B+ TERMINAL CLIP.

VOLTAGE MEASUREMENTS TAKEN WITH NO SIGNAL APPLIED.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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SILVERTONE MODELS 5036, 5042
(Ch. 528.32400, 528.32500)

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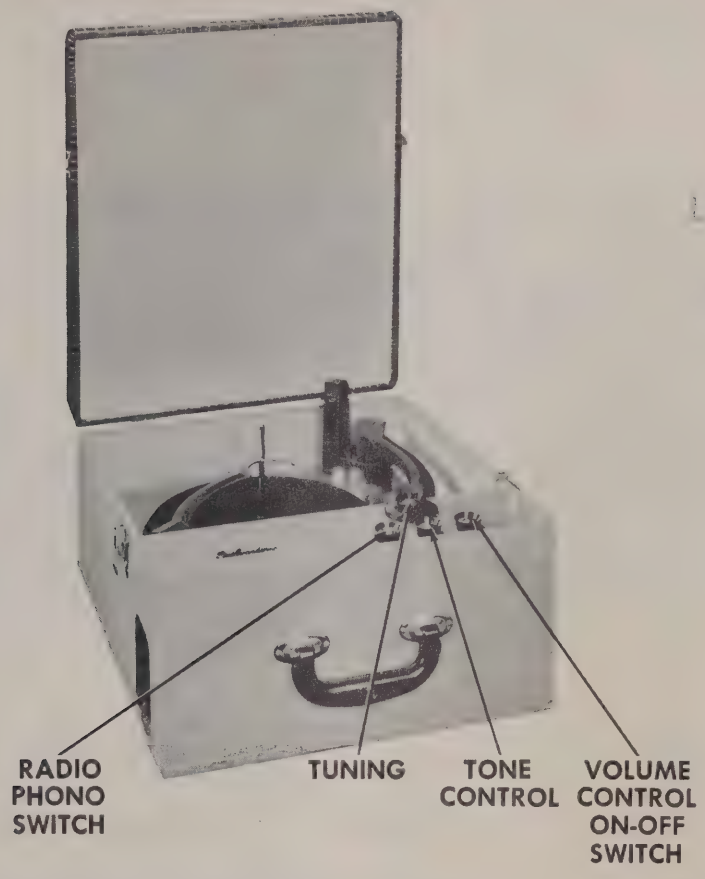
3924 [illegible] ST
[illegible]



SILVERTONE MODELS 5036, 5042
(Ch. 528.32400, 528.32500)

TRADE NAME	Silvertone Models 5036 (Ch. 528.32400), 5042 (Ch. 528.32500)
SUPPLIER	Sears, Roebuck & Co., 925 S. Homan, Chicago, Ill.
TYPE SET	AC Operated Radio-Phono Combination Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AT6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC-60 Cycles — RATING .24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC-1630KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400%Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	"	1630KC	"	"	A5	"
3.		Loop	1400KC	1400KC	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

FOR SERVICE INFORMATION ON RECORD CHANGER UNIT #567.30004 SEE SIMILAR CRESCENT 500 SERIES CHANGER - PHOTOFACT SET #197 — FOLDER #4 OR RECORD CHANGER MANUAL CM-5.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Silvertone PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7BK	
V3	Det.-AVC-AF Amp	12AT6	12AT6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	Silvertone PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	50	150	T18-321			TCD497	TDL-5030-150	FMD-301	
B	30	150							
C2	.05	200	T16-197	DF-503		PT415	IMP2-S5	330215	
C3	47		T15-229	D6-470	831-470	UC-5447		K-1447	
C4	.05	200	T16-197	DF-503		PT415	IMP2-S5	330215	
C5A	220		T17-104	D6-221	GP2K-221	UC-5322		K-1322	
B	2000			DD-202	801-002	DC-522		C-1220	
C	220			D6-221	GP2K-221	UC-5322		K-1322	
D	5000								
C6	.005	600	T16-190	D6-502	GP2-333-502	PT625	IMP6-D5	330625	
C7	.005	600	T16-190	D6-502	GP2-333-502	PT625	IMP6-D5	330625	
C8	.05	400	T16-189	DF-503		PT415	IMP4-S5	330415	
C9	.05	400	T16-189	DF-503		PT415	IMP4-S5	330415	
C10	.05	400	T16-189	DF-503		PT415	IMP4-S5	330415	
C11	470		T15-200	D6-471	GP2K-471	UC-5347		K-1347	Note 1

Note 1. Used only in some versions of Ch. 528.32400.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESIST-ANCE	WATTS	Silvertone PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1Meg	½	A24-196	Q13-137	A47-1Meg-Z	AB-70	U-53	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A
R2A	1Meg	½	A26-128	Q11-137	A47-1Meg-S	AB-69	U-54	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A

RESISTORS

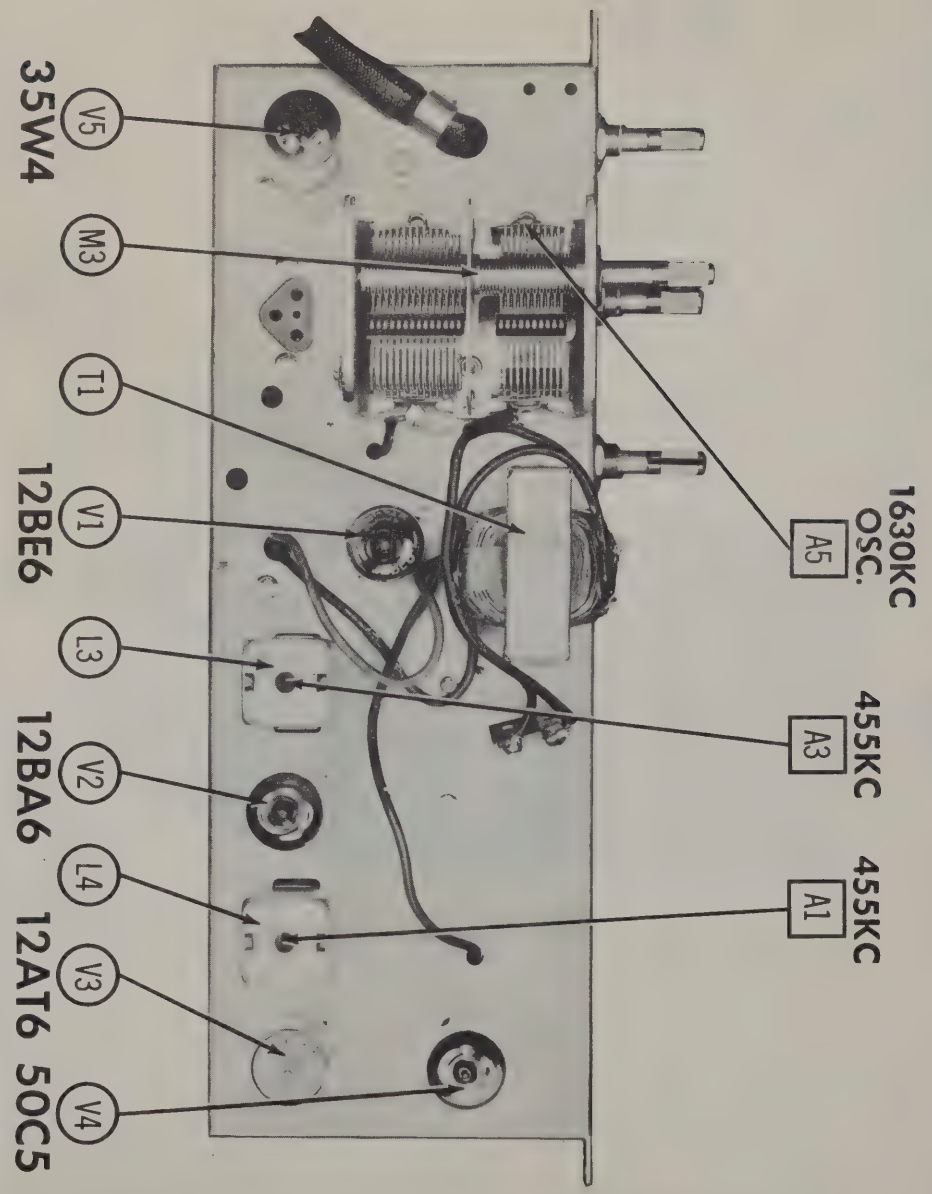
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Silvertone PART No.	IRC PART No.	
R3	22KΩ	½	T60-2230M	BTS-22K	
R4	2.2Meg	½	T60-2250M	BTS-2.2Meg	
R5	47Ω	½	T60-4700K	BTS-47	
R6	47KΩ	½	T60-4730M	BTS-47K	
R7	2.2Meg	½	T60-2250M	BTS-2.2Meg	
R8	10Meg	½	T60-1060M	BTS-10Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Silvertone PART No.	IRC PART No.	
R9	220KΩ	½	T60-2240M	BTS-220K	
R10	470KΩ	½	T60-4740M	BTS-470K	
R11	180Ω	½	T60-1810K	BTS-180	
R12	1000Ω	1	T60-1021K	BTA-1000	
R13	27Ω	½	T60-2700K	BTS-27	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Silvertone PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.3KΩ	1.8Ω	80-323 80-268 ①	Z1102	A-3031	A-3330	24S51A		① Used in Model 5036

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Silvertone PART No.	QUAM PART No.	
SP1	4"	PM	3.6Ω	79-441	4A07	① Used in Model 5036
SP2	4"	PM	3.6Ω	79-441	4A07	
	4 x 6"	PM	3.6Ω	79-392 ①	46A07	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Silvertone PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	3.2Ω		T82-90				
L2	Osc. Coil	.9Ω	8Ω	T16-645	14-1074	BC-381 *	70-OSC	
L3	Input IF	20Ω	20Ω	T10-508	16-6758	BC-352	12-C1	
L4	Output IF	20Ω	20Ω	T10-479	16-6758	BC-353	12-C2	

* Drill mounting hole.

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	Silvertone PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1	T83-821 *	51-2J	G-AG-J	47	0-2 or S-2	* Used in Model 5036
	720044 ■	55-T	GD-J	47	0-1 or S-1 & 0-3	■ Used in Model 5042

ASTATIC AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

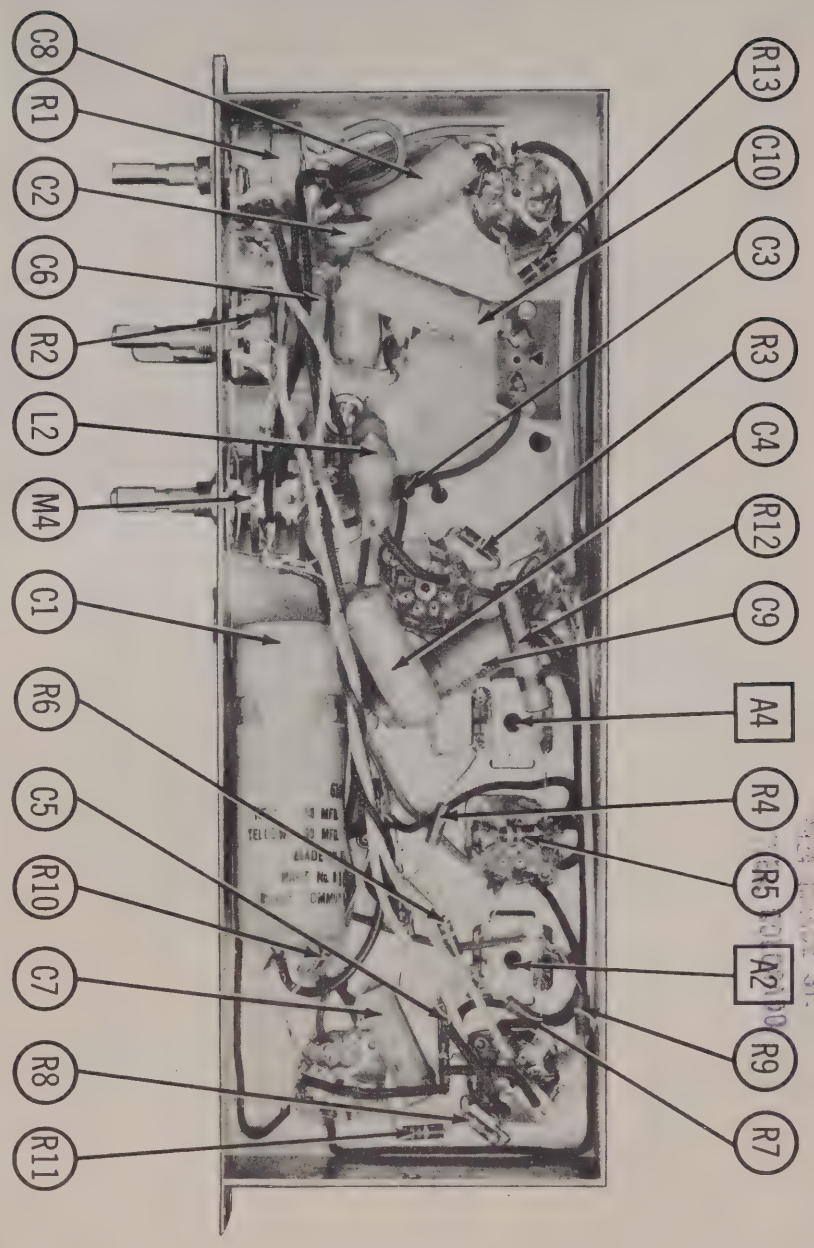
ITEM No.	REPLACEMENT DATA				REMARKS
	Silvertone PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M2	①	*S-652 or †S-642 or ♦S-642D	*B-326 or †B-334 or ♦B-334D	*W-3AGA or †W-3AGS or ♦W-3AGD	* Metal † Jewel ♦ Diamond
	②	*S-67 or †S-66 or ♦†S-66SD or ♦S-66D	†AC-434 or ♦†AC-434D1 or †♦AC-434D2 or ♦AC-434D	†W-75TPS or ♦†W-75DS or ♦W-75TPD	

① For use in Model 5036.
② For use in Model 5042.

MISCELLANEOUS

ITEM No.	PART NAME	Silvertone PART No.	NOTES
M3	Tuning Cap.	T19-242	2 Gang (13-470MMF, 26-190MMF)
M4	Switch	T69-190	Radio-Phono (3PDT)
M5	Switch	010911	On-off (Record Changer)
M6	Phono Motor	T59-36	
	Cabinet	T42-696	Model 5036
	Cabinet	T42-695	Model 5042
	Knob	T52-322	Station Selector - Model 5042
	Knob	T52-502	Tuning - Model 5036
	Knob	T52-323	On-off-Volume - Model 5042
	Knob	T52-407	On-off-Volume - Model 5036
	Knob	T52-327	Tone - Model 5042
	Knob	T52-499	Tone - Model 5036
	Knob	T52-328	Radio-Phono Switch - Model 5042
	Knob	T52-408	Radio-Phono Switch - Model 5036
	Knob	310113	On-off (Record Changer)
	Knob	310114	Speed Control

CHASSIS—BOTTOM VIEW



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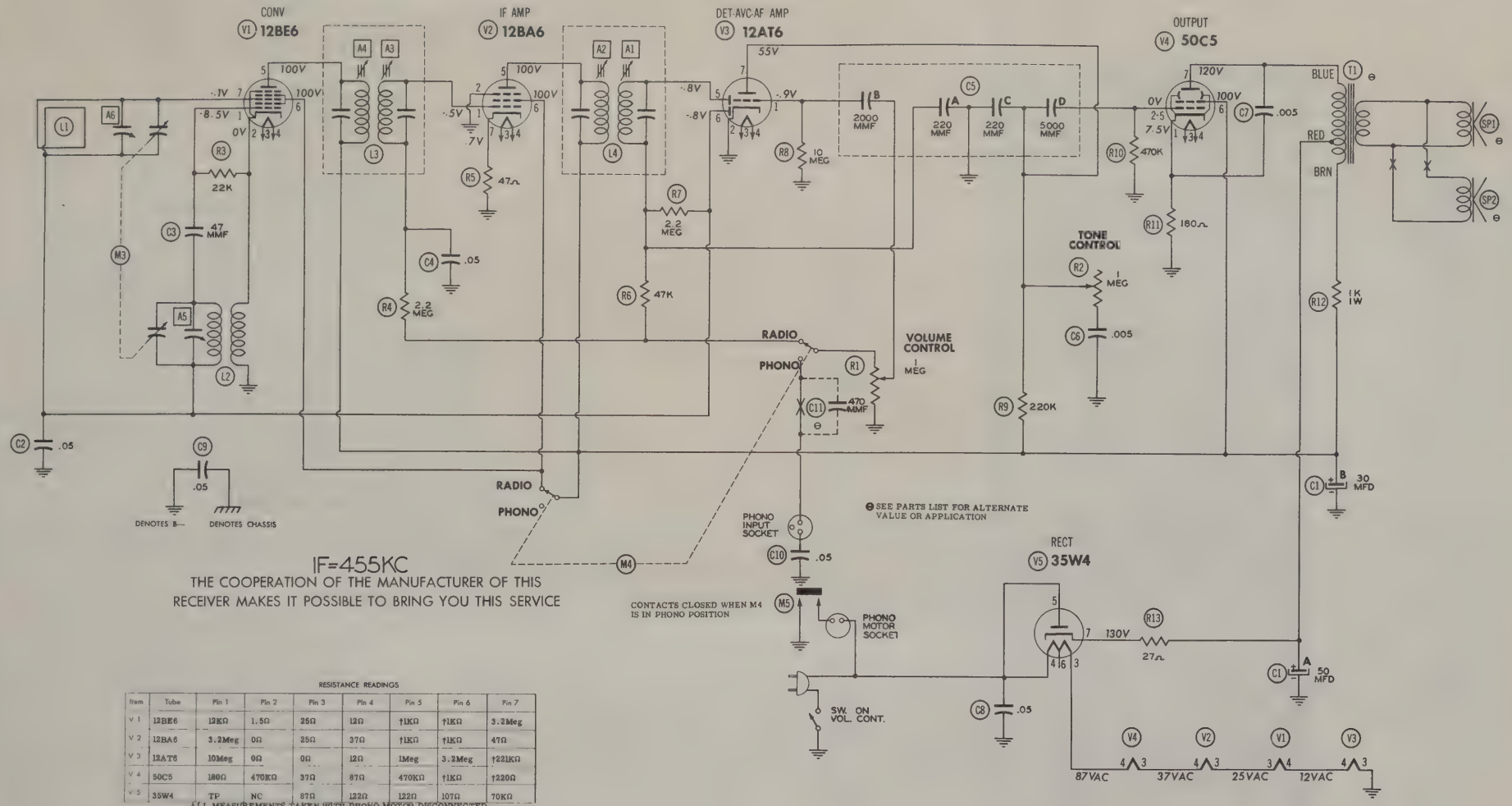
SILVERTONE
MODEL 5036 (Ch. 528.32500)



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	12KΩ	1.5Ω	25Ω	12Ω	†1KΩ	†1KΩ	3.2Meg
V 2	12BA6	3.2Meg	0Ω	25Ω	37Ω	†1KΩ	†1KΩ	47Ω
V 3	12AT6	10Meg	0Ω	0Ω	12Ω	1Meg	3.2Meg	†221KΩ
V 4	50C5	180Ω	470KΩ	37Ω	87Ω	470KΩ	†1KΩ	†220Ω
V 5	35W4	TP	NC	87Ω	122Ω	122Ω	107Ω	70KΩ

ALL MEASUREMENTS TAKEN WITH PHONO MOTOR DISCONNECTED.
RADIO-PHONO SWITCH IN RADIO POSITION
† MEASURED FROM PIN 7 OF V5
TP - TIE POINT
NC - NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

STROMBERG-CARLSON
MODEL C-5 (DeLuxe)

STROMBERG-CARLSON
MODEL C-5 (DeLuxe)

TRADE NAME	Stromberg-Carlson Model C-5 Deluxe
MANUFACTURER	Stromberg-Carlson Co., Service Dept., 1700 University Ave., Rochester 10, N.Y.
TYPE SET	AC Operated AM Superheterodyne Receiver With Electric Clock
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det.-AVC-AF amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles — RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V2). Low side to B-.	455KC (400~Mod.)	Point of non-interference	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	"	1625KC	Tuning gang fully open	"	A5	"
3.		Loop	1400KC	1400KC	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: Stromberg-Carlson PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det.-AVC-AF Amp.	12AV6	12AV6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: Stromberg-Carlson PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	50	150	111124			TCD49	TDL-D50-150	MTD-1550	
B	50	150							
C2	.05	400	110801	DF-503		PT415	IMP4-S5	330415	
C3	100		110694	D6-101	GP1K-101	UC-531		K-1310	
C4	.005	400	110688	D6-502	GP2-333-502	PT625	IMP6-D5	C-1250	
C5A	5000								
B	250		♦128202	♦PC-70	♦1406-01				
C									
C6	10000		110672	DD-103	811-01	DC-511	IMP6-S1	330611	
C7	.05	400	110801	DF-503		PT415	IMP4-S5	330415	
C8	.1	400	110802	DF-104		PT401	IMP4-P1	330401	

♦ Items C5A, C5B, C5C, R8A and R8B are combined in one unit.
When replacing items separately, C5B and C5C should total 250MMF.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: Stromberg-Carlson PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	145185	Q13-133	A47-500K-Z	B-60-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R1A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: Stromberg-Carlson PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	22KΩ	½	149109	BTS-22K	
R3	150Ω	½	28148	BTS-150	
R4	82Ω	½		BTS-82	Note 1
R5	47KΩ	½	149111	BTS-47K	
R6	2.2Meg	½	149121	BTS-2.2Meg	

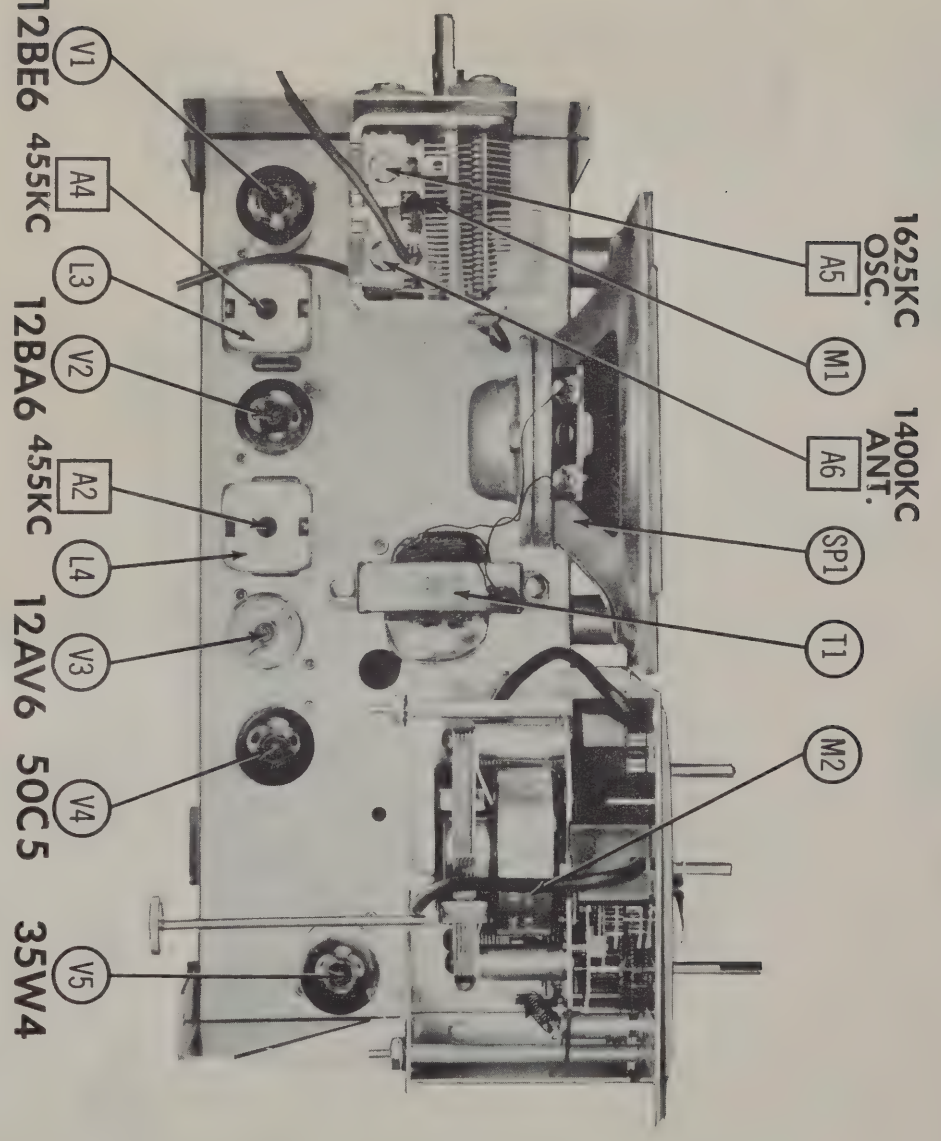
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: Stromberg-Carlson PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R7	10Meg	½	149125	BTS-10Meg	
R8 A	500KΩ	½	♦	BTS-470K	
B	500KΩ	½		BTS-470K	
R9	150Ω	½	28148	BTS-150	
R10	1200Ω	1	149177	BTA-1200	

Note 1. Not used in some versions.
♦ Items R8A, R8B, C5A, C5B and C5C are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: Stromberg-Carlson PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2.3KΩ	3.4Ω	161279	Z1101	A-3025	A-3332	26S58 ①	S-12X	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Stromberg-Carlson PART No.	QUAM PART No.	
SP1	4"	PM	3.4Ω	155844	4A07	

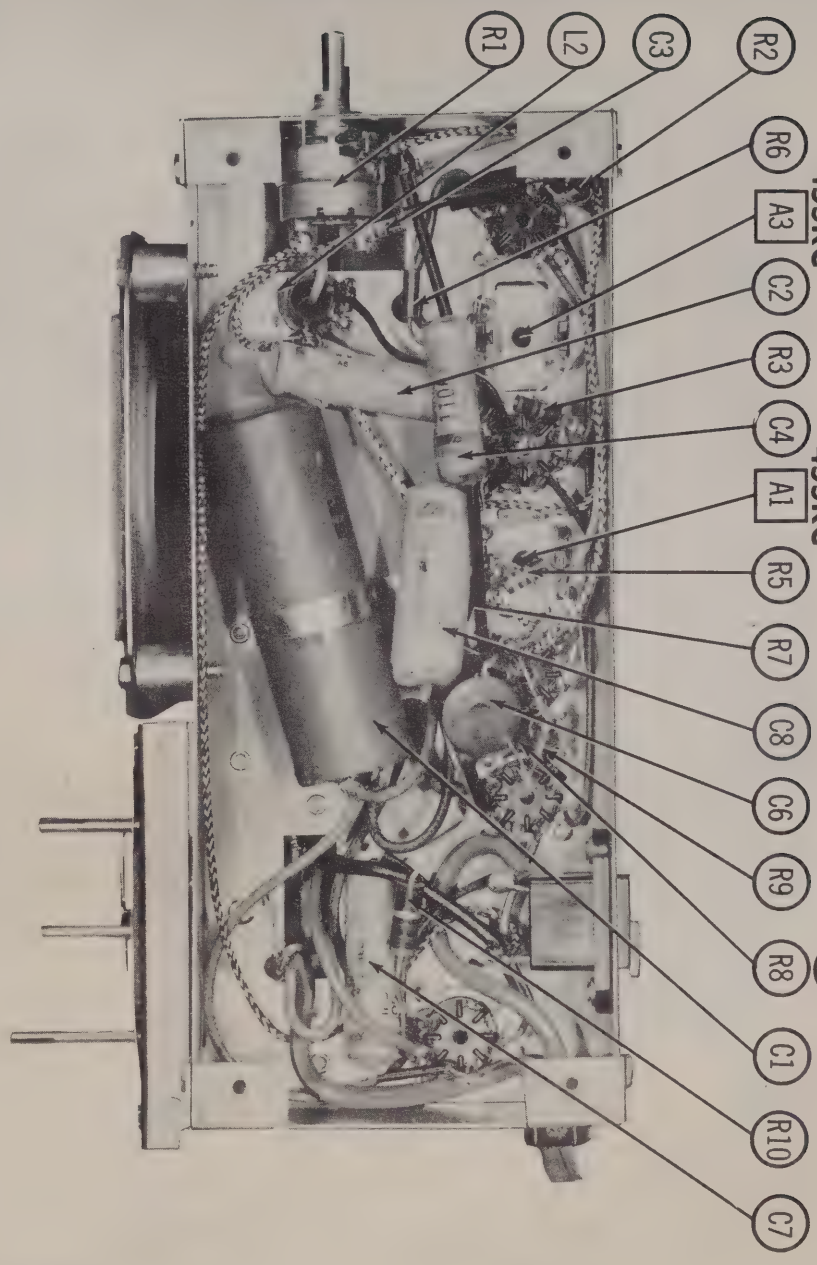
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Stromberg-Carlson PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	.6Ω		139062				Includes cabinet back
L2	Osc. Coil	.7Ω	7Ω	114144	14-1060		71-OSC	
L3	Input IF	15Ω	15Ω	114364	16-6758	BC-352	12-C1	
L4	Output IF	15Ω	15Ω	114453	16-6754	BC-355	12-C6	

MISCELLANEOUS

ITEM No.	PART NAME	Stromberg-Carlson PART No.	NOTES
M1	Tuning Cap.	110058	2 Gang (26-370MMF, 15-120MMF)
M2	Clock	140010	
	Cabinet	108436	Citron
	Cabinet	108437	Black
	Cabinet	108438	Antique White
	Cabinet	108439	Coral
	Cabinet	108440	Green
	Cabinet	108441	Sandalwood
	Knob	134248	Clock (3 used)
	Knob	134246	On-off-volume
	Knob	134247	Tuning
	Crystal	140012	Clock

CHASSIS—BOTTOM VIEW



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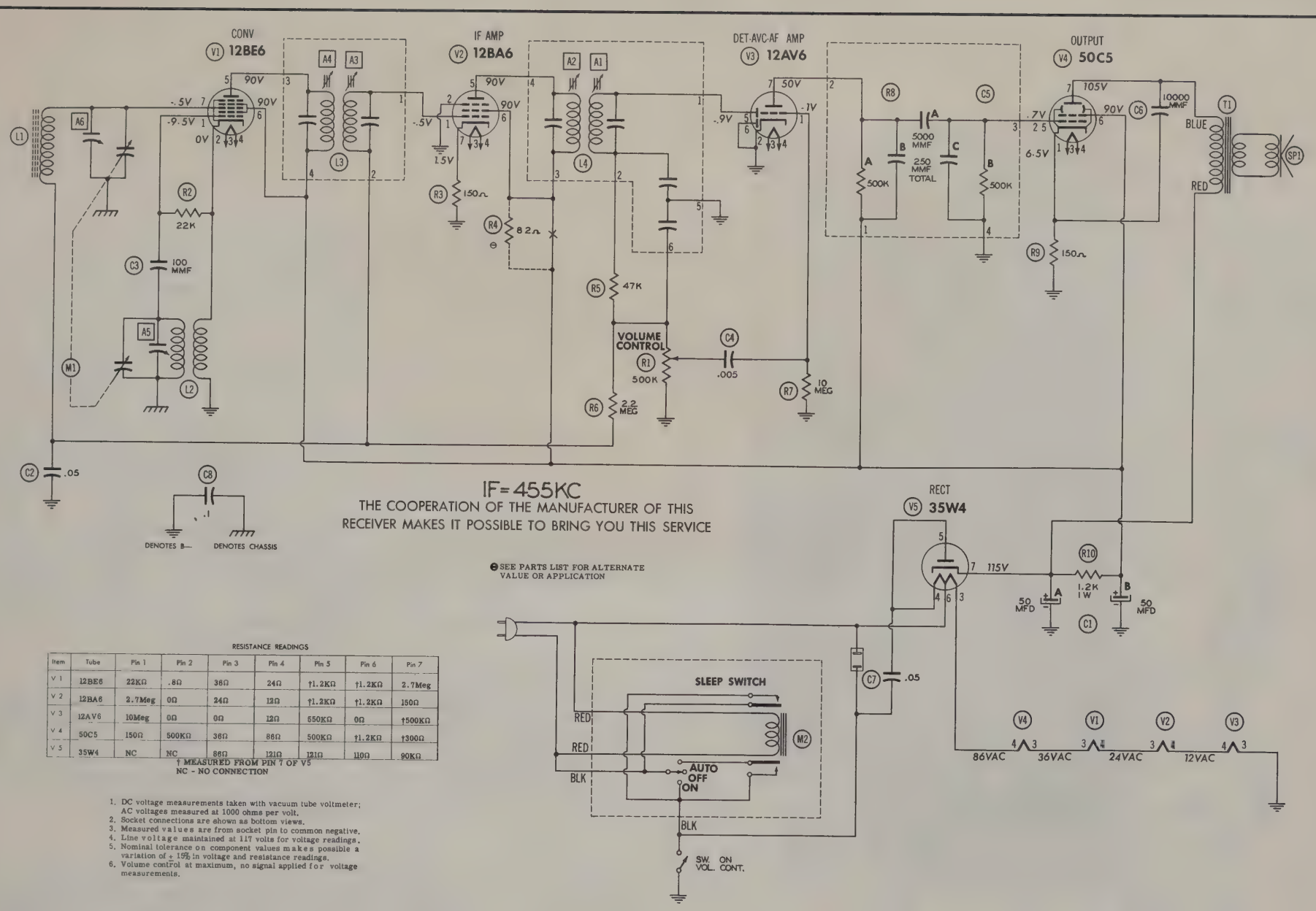
STROMBERG-CARLSON
MODEL C-5 DELUXE



IF = 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.8Ω	36Ω	24Ω	†1.2KΩ	†1.2KΩ	2.7Meg
V 2	12BA6	2.7Meg	0Ω	24Ω	12Ω	†1.2KΩ	†1.2KΩ	150Ω
V 3	12AV6	10Meg	0Ω	0Ω	12Ω	550KΩ	0Ω	†500KΩ
V 4	50C5	150Ω	500KΩ	36Ω	86Ω	500KΩ	†1.2KΩ	†300Ω
V 5	35W4	NC	NC	86Ω	121Ω	121Ω	110Ω	90KΩ

† MEASURED FROM PIN 7 OF V5
NC - NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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283-12

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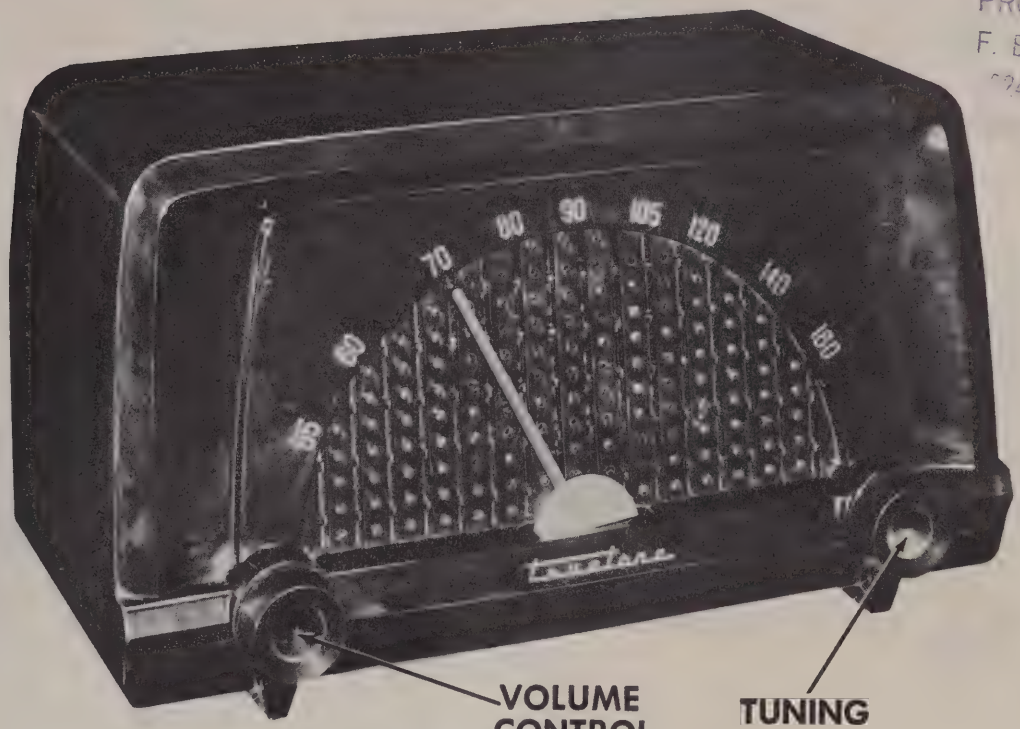
TRUETONE
MODELS D2552A, D2553A



VOLUME CONTROL ON-OFF SWITCH

TUNING

TRUETONE
MODELS D2552A, D2553A

TRADE NAME	Truetone Models D2552A, D2553A
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Six)	Types 12AU6 Mixer, 12BF6 Osc., 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 35C5 Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC-DC RATING .23 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	200MMF	High side to antenna terminal lug . Low side to chassis.	455KC (400%Mod)	Point of non-interference	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	1650KC	Tuning gang fully open	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1500KC	Tune to 1500KC signal	"	A6	"

DIAL POINTER ADJUSTMENT

Turn tuning gang fully counter clockwise.
Move pointer (with gang closed) until it is over 3rd. dot located on first vertical line at left side of speaker grille.
Check entire dial range and adjust for any objectionable error.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		TRUETONE PART No.	STANDARD REPLACEMENT		
V1	Mixer	12AU6	12AU6	7BK	
V2	Oscillator	12BF6	12BF6	7BT	
V3	IF Amplifier	12BA6	12BA6	7BK	
V4	Det.-AVC-AF Amp.	12AV6	12AV6	7BT	
V5	Audio Output	35C5	35C5	7CV	
V6	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	TRUETONE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	50	150	521763			TCD497	TDL-5030-150	MTD-301	
B	30	150							
C2	150		513004	TCZ-150	NP0-334-151	ZT-5315		KR-1315	
C3	.05	400	512059	DF-503		PT415	IMP4-S5	330415	
C4	47		513002	TCZ-47	NP0-338-470	ZT-5447		KR-1447	
C5	.05	400	512029	DF-503		PT415	IMP4-S5	330415	
C6	.047	400	512029	DF-503		PT4147	IMP4-S47	3304147	
C7A	220		♦509433	♦PC-150	♦1408-01				
B	2000								
C	5000								
D	250								
E									
C8	.02	400	512312	DF-203	817-02	PT412	IMP4-S2	330412	
C9	.05	400	512029	DF-503		PT415	IMP4-S5	330415	
C10	.15	400	512041			PT4015	IMP4-P15	3304015	

♦ Items C7A, C7B, C7C, C7D, C7E, R7A, R7B and R7C are combined in one unit.
When replacing items separately, C7D and C7E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	TRUETONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1Meg	½	523243	Q13-137	A47-1Meg-Z	AB-70	U-53	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	TRUETONE PART No.	IRC PART No.	
R2	2.2Meg	½	510193	BTS-2.2Meg	
R3	33KΩ	½	510163	BTS-33K	
R4	47KΩ	½	510166	BTS-47K	
R5	100Ω	½	510119	BTS-100	
R6	2.2Meg	½	510193	BTS-2.2Meg	

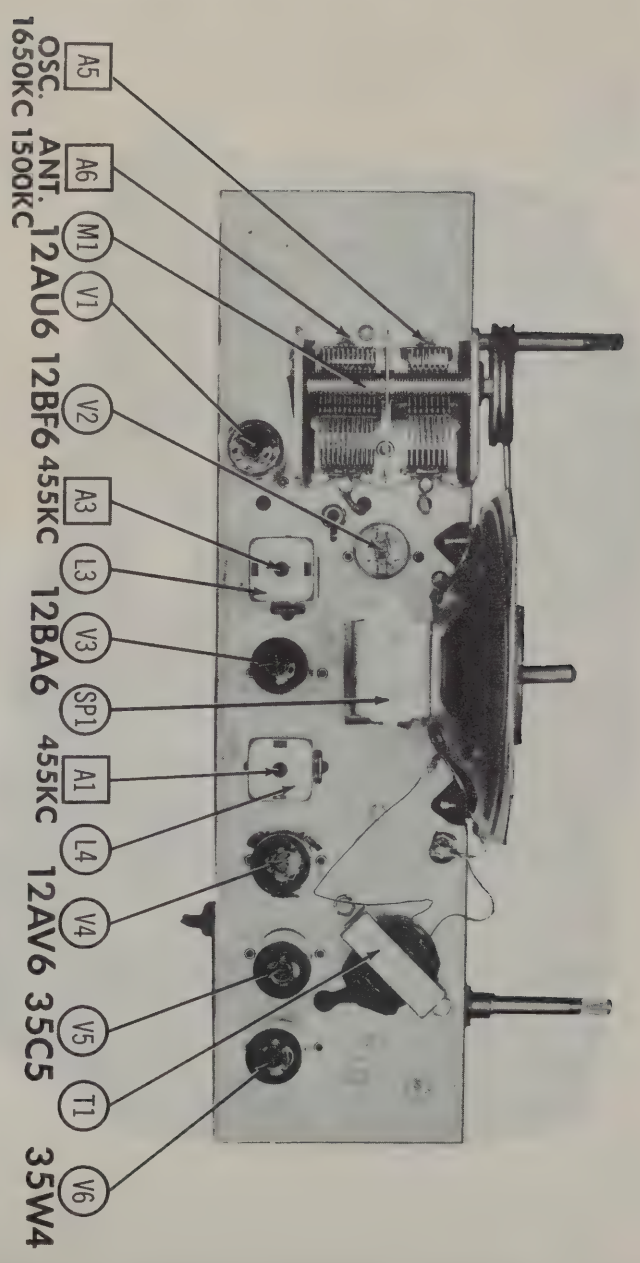
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	TRUETONE PART No.	IRC PART No.	
R7A	6.8Meg	½	♦509836	BTS-6.8Meg	
B	470KΩ	½		BTS-470K	
C	470KΩ	½		BTS-470K	
R8	150Ω	½	510122	BTS-150	
R9	1000Ω	1	510237	BTA-1000	

♦ Items R7A, R7B, R7C, C7A, C7B, C7C, C7D and C7E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	TRUETONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.4KΩ	3.3Ω	521779	Z1102 ①	A-3031 ①	A-3330 ①	24S50 ①	S-16X	① Drill one new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

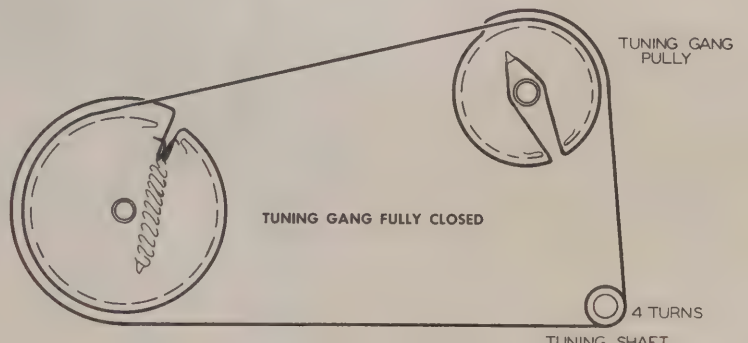
ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	TRUETONE PART No.	QUAM PART No.	
SP1	4"	PM	3.3Ω	509828	4A07	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	3.5Ω		523230				Includes cabinet back
L2	Osc. Coil	1.3Ω *	9Ω	523227			71-OSC	* Tapped @ .5Ω
L3	Input IF	17Ω	17Ω	509433	16-6758	BC-352	12-C1	
L4	Output IF	17Ω	17Ω	509433	16-6758	BC-353	12-C2	

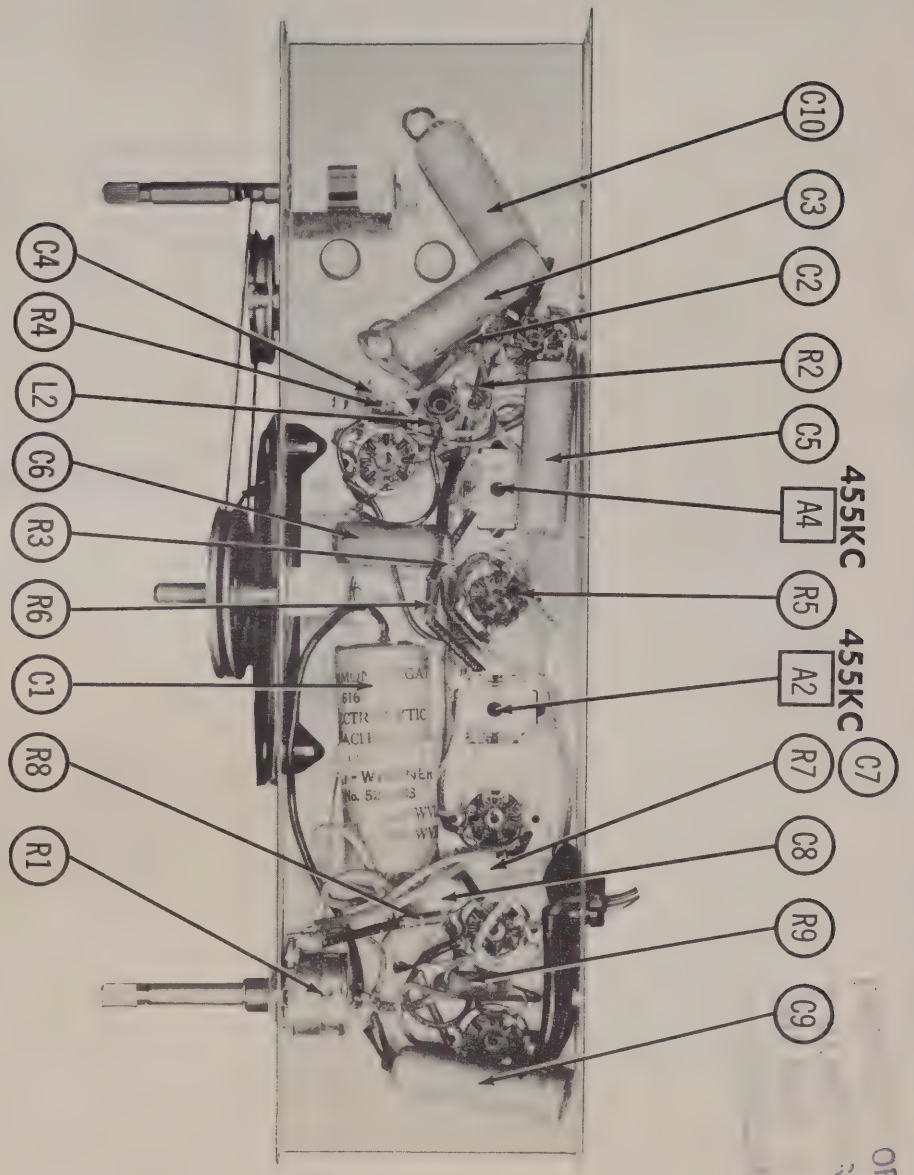
MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
M1	Tuning Cap.	523228	2 Gang (13-105MMF, 18-375MMF)
	Cabinet	523245	Model D2552A
	Cabinet	523200	Model D2553A
	Knob	521070	On-off-volume and tuning - Model D2552A
	Knob	523241	On-off-volume and tuning - Model D2553A
	Dial Pointer	523234	Model D2552A
	Dial Pointer	523239	Model D2553A



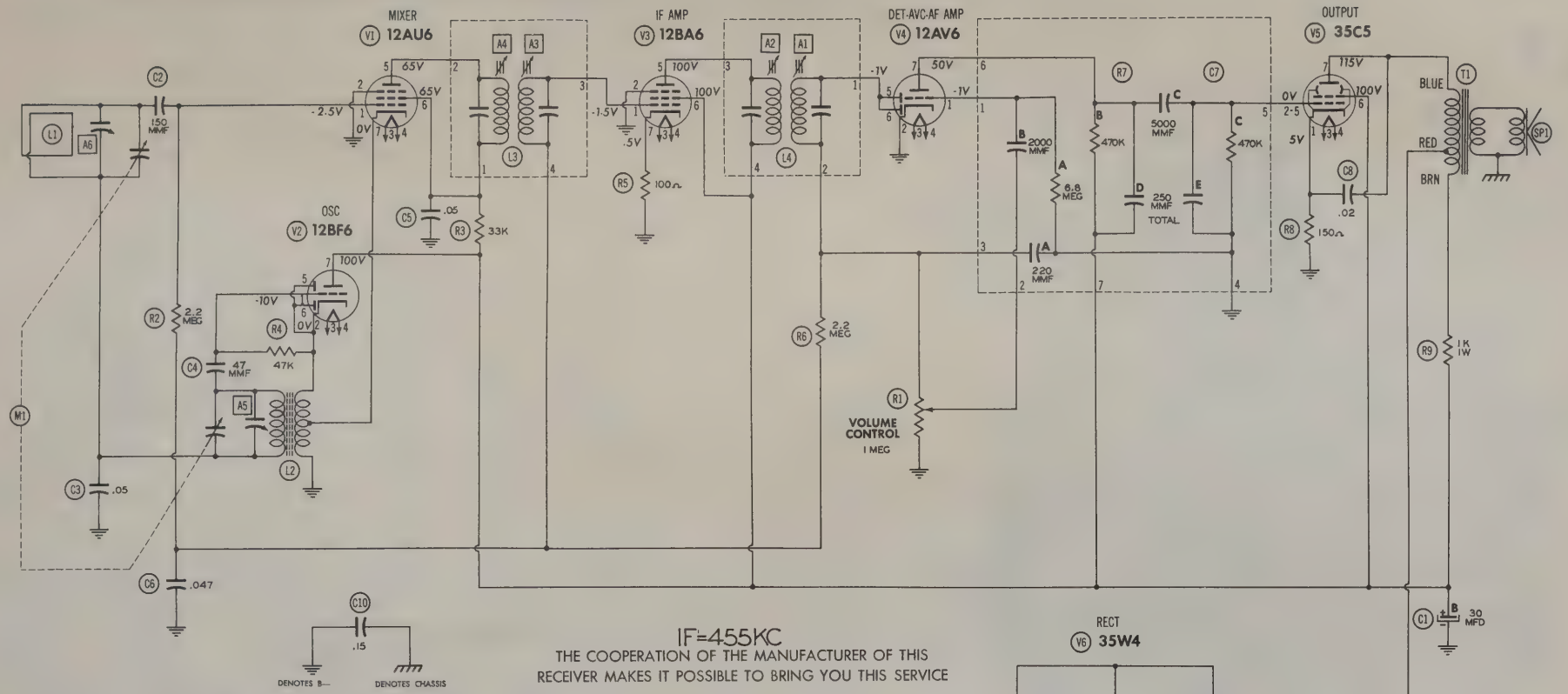
DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



TRUETONE MODEL D2552A

OF SHIP



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12AU6	5Meg	0Ω	24Ω	36Ω	†34KΩ	†34KΩ	.5Ω
V 2	12BF6	47KΩ	1.4Ω	12Ω	24Ω	1.4Ω	1.4Ω	†1KΩ
V 3	12BA6	3.2Meg	0Ω	36Ω	48Ω	†1KΩ	†1KΩ	100Ω
V 4	12AV6	6.8Meg	0Ω	0Ω	13Ω	1Meg	1Meg	†470KΩ
V 5	35C5	150Ω	470KΩ	48Ω	83Ω	470KΩ	†1KΩ	†250Ω
V 6	35W4	NC	TP	83Ω	117Ω	117Ω	108Ω	60KΩ

† MEASURED FROM PIN 7 OF V6
NC - NO CONNECTION
TP - TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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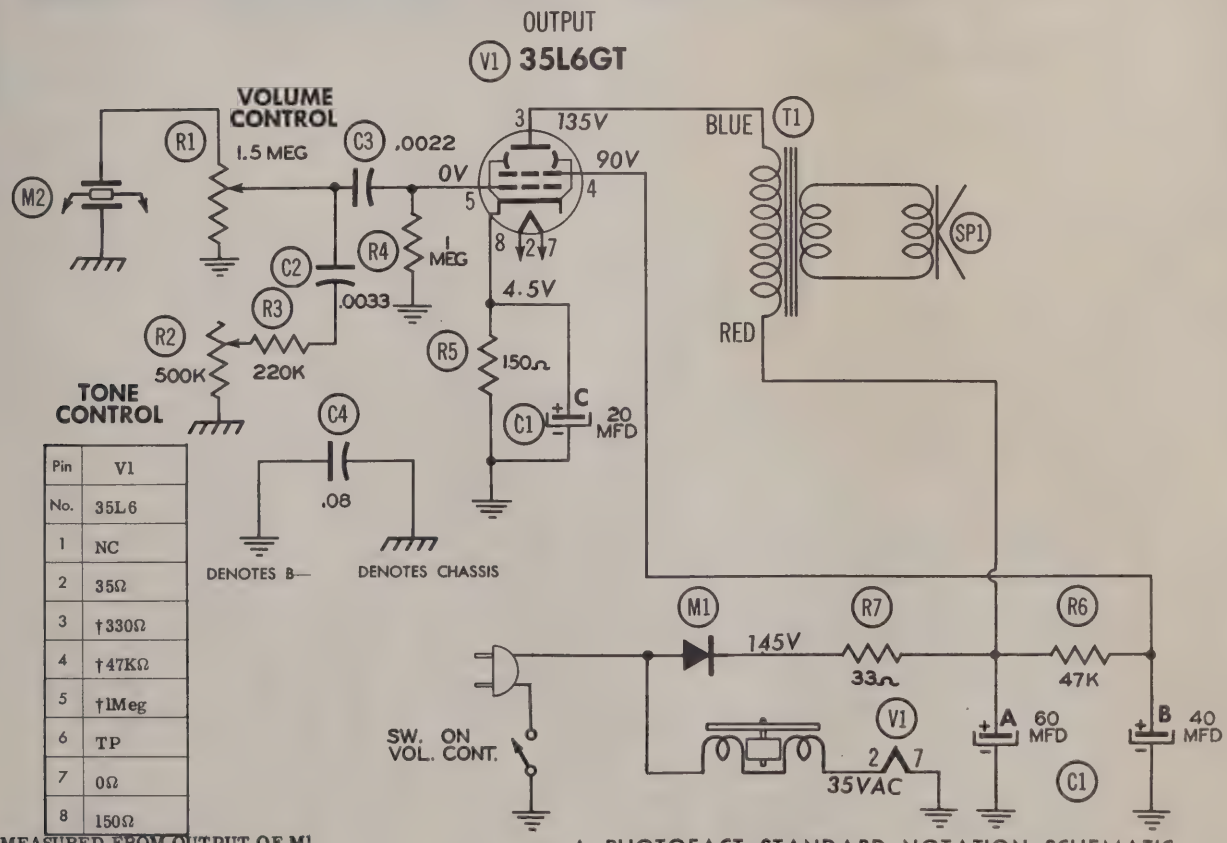
3324 MEADE ST.
DENVER, COLORADO

V-M
MODEL 131

TRADE NAME	V-M Model 131
MANUFACTURER	V-M Corp., Benton Harbor, Michigan
TYPE SET	AC Operated Phono Amplifier With 4 Speed Manual Record Player
TUBES (One)	Type 35L6GT Audio Amplifier
POWER SUPPLY	105-120 Volts AC - 60 Cycles RATING .2 Amp. @ 117 Volts AC



Pin No.	V1 35L6
1	NC
2	35Ω
3	†330Ω
4	†47KΩ
5	†1Meg
6	TP
7	0Ω
8	150Ω

† MEASURED FROM OUTPUT OF M1.
NC - NO CONNECTION
TP - TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		V-M PART No.	STANDARD REPLACEMENT		
V1	Output	35L6GT	35L6GT	7S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	V-M PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	60	150				FP311.7	TM-604025-350	T-515	
B	40	150							
C	20	25							
C2	.0033	600		D6-332	GP2-333-332	PT6233	IMP6-D33	3306233	
C3	.0022	600		D6-222	GP2-333-222	PT6222	IMP6-D22	3306222	
C4	.08	400				PT418	IMP4-S8	330418	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	V-M PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1.5Meg	½	11950	Q11-138	A47-1.5Meg-S	AB-75	U-155	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A
R2A	500KΩ	½	11980-1	Q11-133	A47-500K-S	AB-59	U-50	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	V-M PART No.	IRC PART No.	
R3	220KΩ	½		BTS-220K	
R4	1Meg	½		BTS-1Meg	
R5	150Ω	½		BTS-150	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	V-M PART No.	IRC PART No.	
R6	47KΩ	½		BTS-47K	
R7	33Ω	½		BTS-33	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	V-M PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.1KΩ	3.1Ω		Z1001	A-2928①	A-3876①	24S50①	S-2X①	① Bend mounting tabs down, file out slots, and mount on original mounting bracket.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	V-M PART No.	QUAM PART No.	
SP1	4"	PM	3.1Ω		4A07	

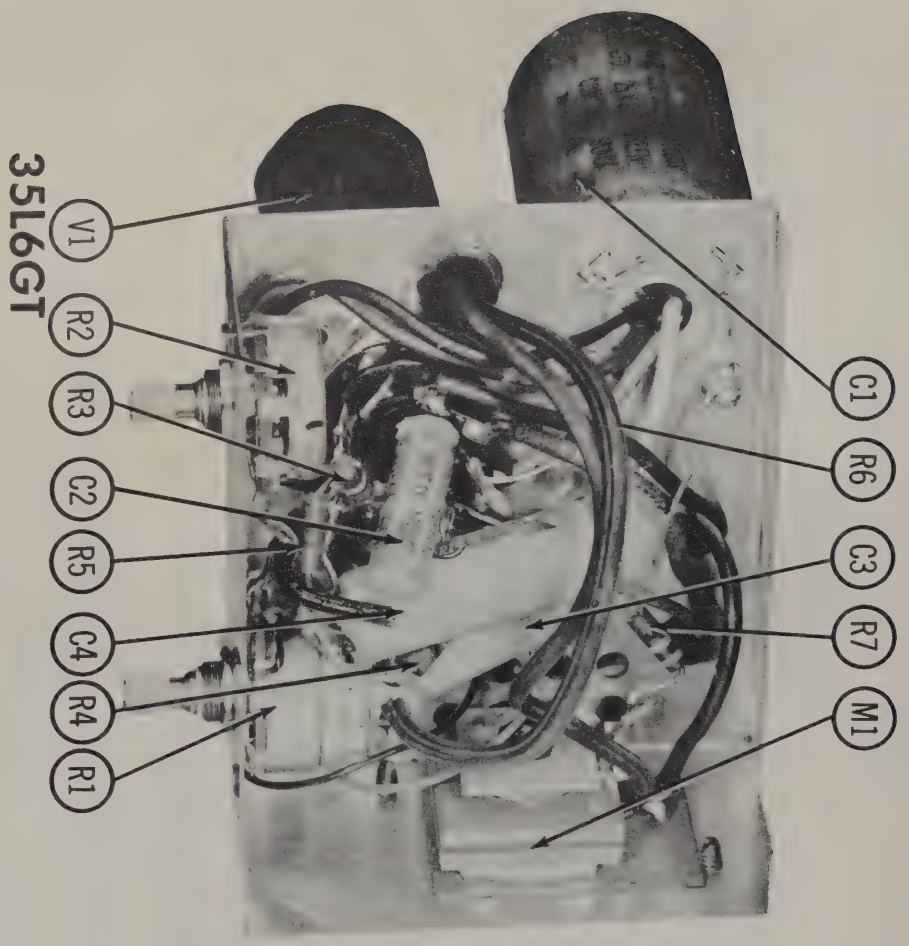
SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	V-M PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.034A		1263A	RS65	6S65	8J1	65	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	V-M PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M2		68-T				

CHASSIS—BOTTOM VIEW



PHONO NEEDLE

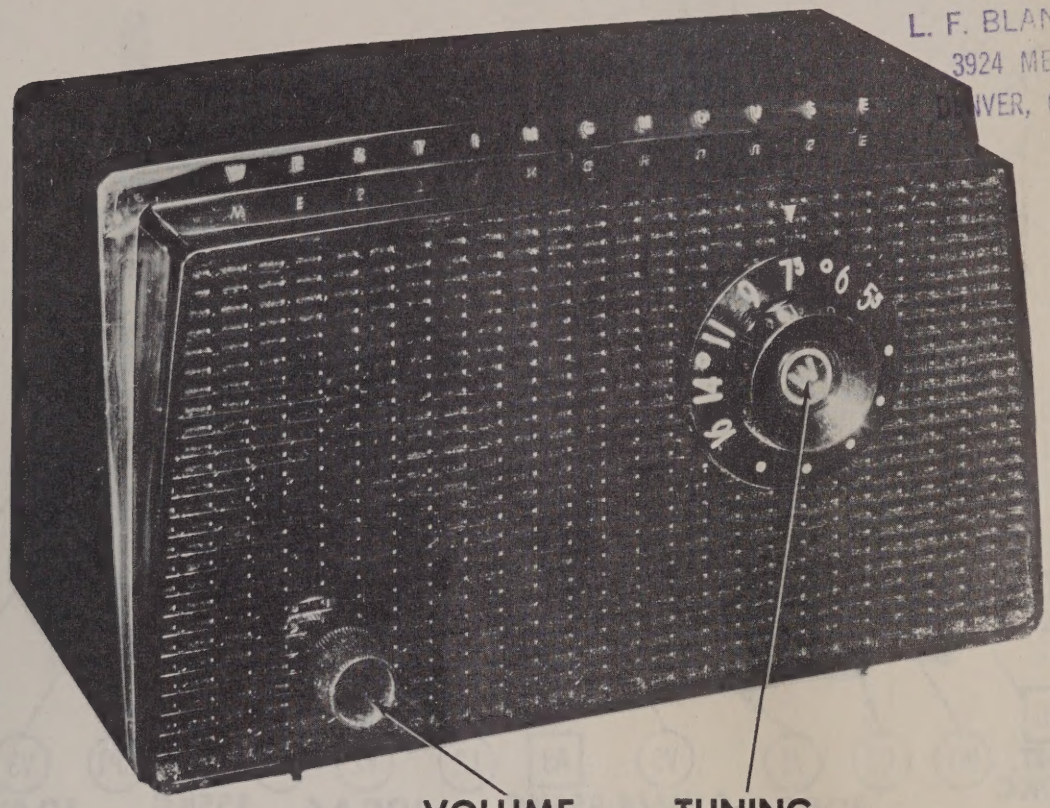
(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA				REMARKS
	V-M PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M3		*A-70LP and *A-70	*A-428 and *C-430	*W-25MGA and *W-25A	* Metal

WESTINGHOUSE MODELS H-499T5, H-500T5, H-501T5, H-502T5, H-503T5 (Ch. V-2184-6)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

WESTINGHOUSE MODELS H-499T5, H-500T5, H-501T5, H-502T5, H-503T5 (Ch. V-2184-6)



WESTINGHOUSE MODELS H-499T5, H-500T5, H-501T5, H-502T5, H-503T5 (Ch. V-2184-6)

TRADE NAME	Westinghouse Models H-499T5, H-500T5, H-501T5, H-502T5, H-503T5 (Ch. V-2184-6)
MANUFACTURER	Westinghouse Electric Corp., TV-Radio Div., Metuchen, N.J.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-120 Volts AC-DC — RATING .22 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC - 1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	200MMF	High side to antenna terminal lug. Low side to B-.	455KC (400∿ Mod)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2.	"	"	1625KC	"	"	A5	"
3.		Loop	1400KC	1400KC	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA Westinghouse PART No.	REPLACEMENT DATA STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det-AVC-AF Amp.	12AV6	12AV6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA Westinghouse PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	50	150	V-11611-1			TCD49	TDL-D50-150	MTD-1550	Red
B	50	150							Orange
C2	10			DD-100	831-100	ZT-541			Note 1
C3	10000		R2CC63Z5Z103D	DD-103	811-01	DC511	IMP6-S1	C-06110	
C4	2000		R2CC61Y5Y202M	DD-202	801-002	DC522		C-1220	
C5A	220								
B	5000								
C	5000		♦V-10789-2	♦PC-151	♦1408-02				
D	250								
E									
C6	10000		R2CC63Z5Z103D	DD-103	811-01	DC511	IMP6-S1	330611	
C7	.047	400	V-10157-4473M	DF-503		PT4147	IMP4-S47	3304147	
C8	.05	400	RCP10M4503M	DF-503		PT415	IMP4-S5	330415	

Note 1: Not used in some versions.
♦ Items C5A, C5B, C5C, C5D, C5E, R5A, R5B and R5C are combined in one unit.
When replacing items separately, C5D and C5E should total 250MMF.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA Westinghouse PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	V-9993-17	Q13-133	A47-500K-Z	AB-60	U-48	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Westinghouse PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R2	22KΩ	½	RC20AE223M	BTS-22K	
R3	680Ω	½	RC20AE681M	BTS-680	
R4	3.3Meg	½	RC20AE335M	BTS-3.3Meg	
R5A	6.8Meg	½		BTS-6.8Meg	
B	470KΩ	½	♦V-10789-2	BTS-470K	
C	470KΩ	½		BTS-470K	

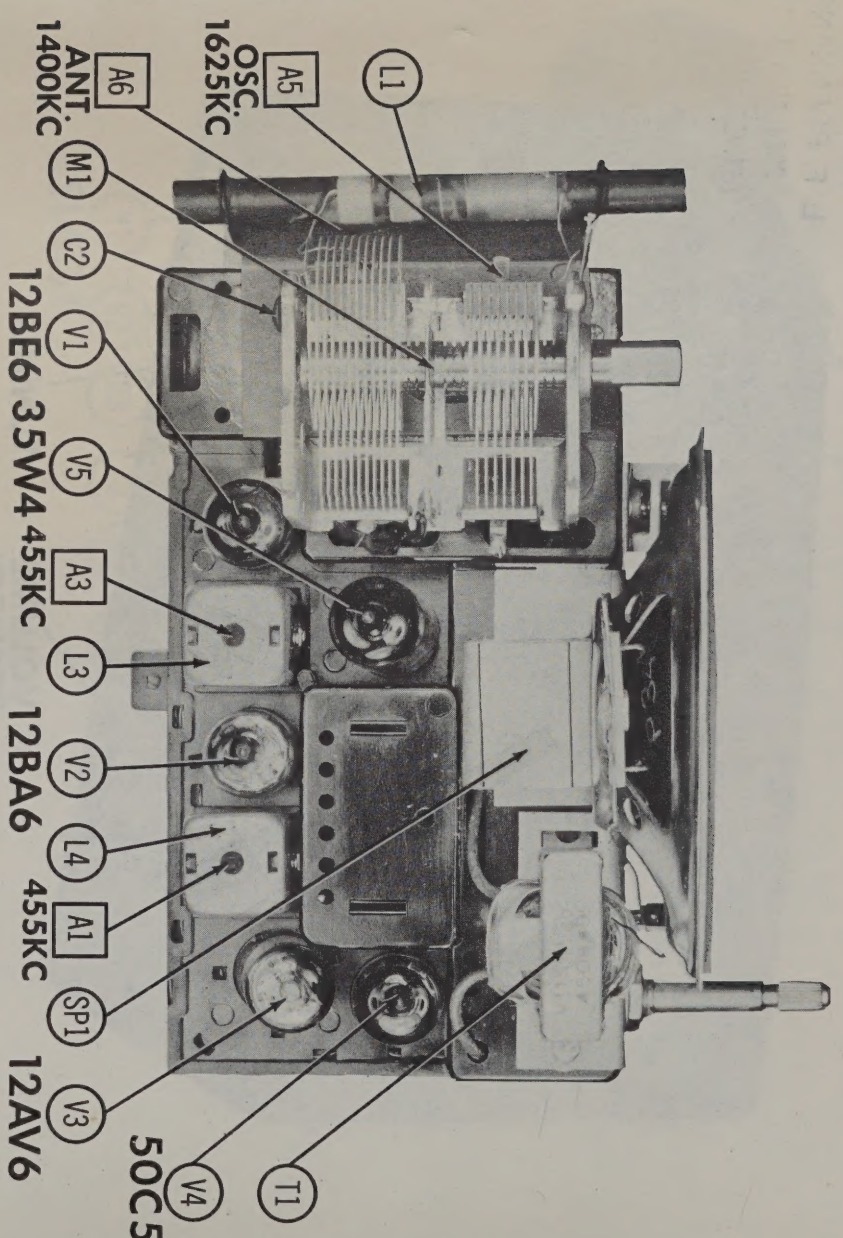
ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Westinghouse PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R6	150Ω	½	RC20AE151M	BTS-150	
R7	1000Ω	1	RC30AE102M	BTA-1000	

♦ Items R5A, R5B, R5C, C5A, C5B, C5C, C5D and C5E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2.3KΩ	3.3Ω	V-11561G-1 V-11561-1 ①	Z1101	A-3025	A-3332	26S58	S-12X	① Alternate audio output.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Westinghouse PART No.	QUAM PART No.	
SP1	4"	PM	3.3Ω	V-11554-1	4A07	

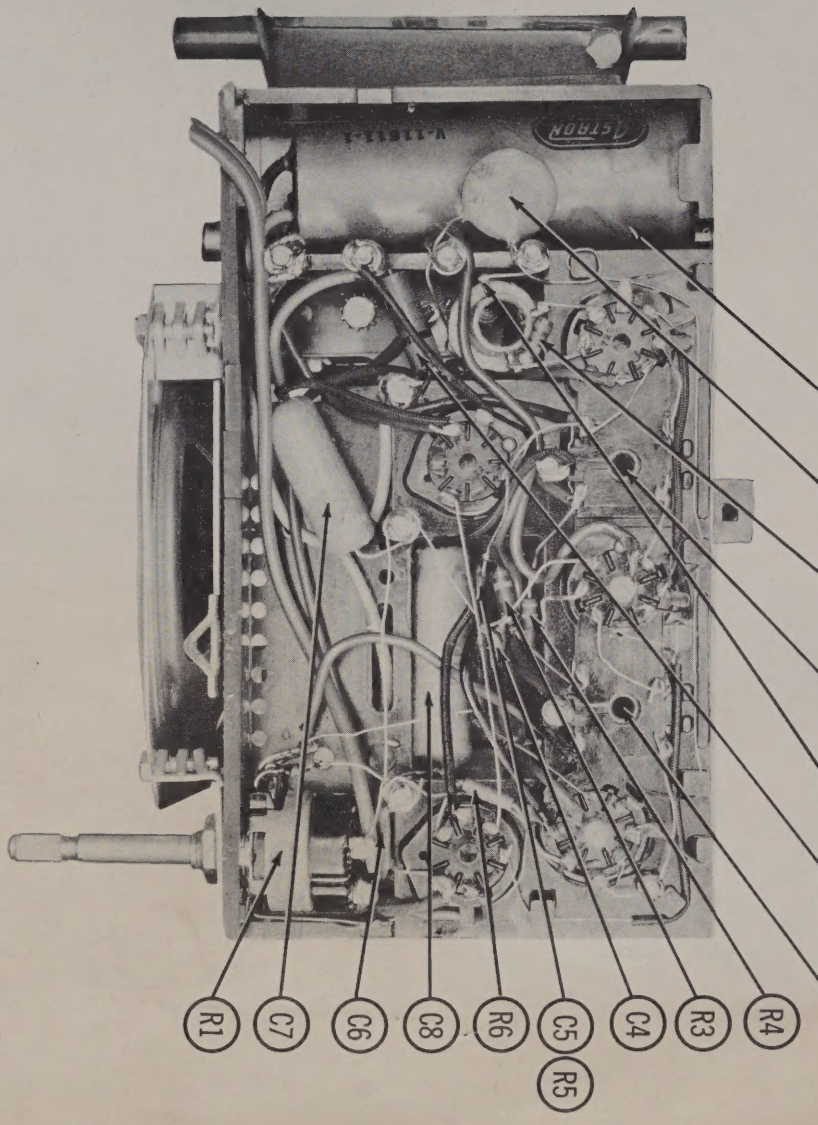
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Westinghouse PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	1Ω		V-11550-3				
L2	Osc. Coil	1Ω	12Ω	V-11555-1	14-1073		69-Osc.	
L3	Input IF	16Ω	16Ω	V-11579-1	16-6758	BC-352	12-C1	
L4	Output IF	16Ω	16Ω	V-11579-1	16-6758	BC-353	12-C2	

MISCELLANEOUS

ITEM No.	PART NAME	Westinghouse PART No.	NOTES
M1	Tuning Cap.	V-11277-5	2 Gang (21-395MMF; 17-110MMF)
	Cabinet	V-1400-9	Model H-499T5
	Cabinet	V-1400-1	Model H-500T5
	Cabinet	V-1400-2	Model H-501T5
	Cabinet	V-1400-3	Model H-502T5
	Cabinet	V-1400-4	Model H-503T5
	Knob	V-14481-9	Dial - Model H-499T5
	Knob	V-14481-5	Dial - Model H-500T5
	Knob	V-14481-6	Dial - Model H-501T5
	Knob	V-14481-7	Dial - Model H-502T5
	Knob	V-14481-8	Dial - Model H-503T5
	Knob	V-14483-13	On-Off-Volume - Model H-499T5
	Knob	V-14483-14	On-Off-Volume - Model H-500T5
	Knob	V-14483-15	On-Off-Volume - Model H-501T5
	Knob	V-14483-16	On-Off-Volume - Model H-502T5
	Knob	V-14483-17	On-Off-Volume - Model H-503T5

CHASSIS—BOTTOM VIEW



PROPERTY OF
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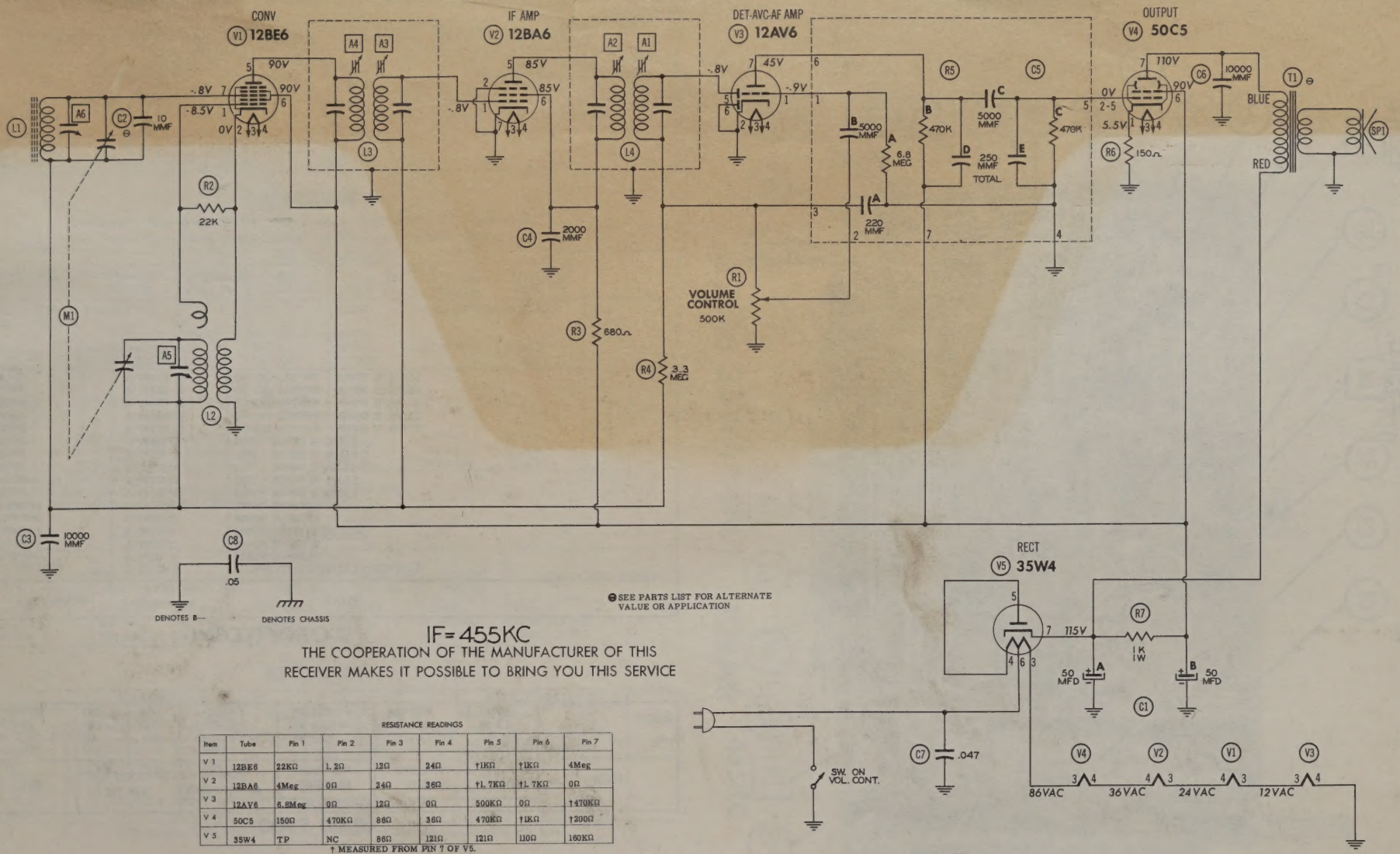

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

IF = 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	1.2Ω	12Ω	24Ω	†1KΩ	†1KΩ	4Meg
V 2	12BA6	4Meg	0Ω	24Ω	36Ω	†1.7KΩ	†1.7KΩ	0Ω
V 3	12AV6	6.8Meg	0Ω	12Ω	0Ω	500KΩ	0Ω	†470KΩ
V 4	50C5	150Ω	470KΩ	86Ω	36Ω	470KΩ	†1KΩ	†200Ω
V 5	35W4	TP	NC	86Ω	121Ω	121Ω	110Ω	160KΩ

† MEASURED FROM PIN 7 OF V5.
TP - TIE POINT
NC - NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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283-15